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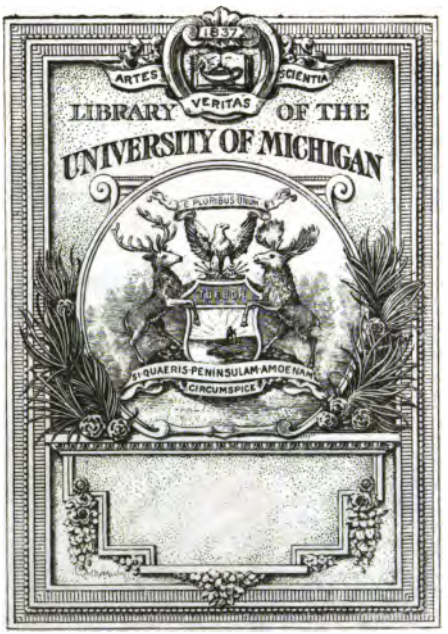

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BIRD STUDIES WITH A CAMERA

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By FRANK M. CHAPMAN.

Bird Studies with a Camera. With Introductory Chapters on the Outfit and Methods of the Bird Photographer. By FRANK M. CHAPMAN, Assistant Curator of Vertebrate Zoölogy in the American Museum of Natural History; Author of "Handbook of Birds of Eastern North America" and "Bird-Life." Illustrated with over 100 Photographs from Nature by the Author. 12mo. Cloth, $1.75.

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1. Gannet (flying over), Murres, Puffins, and Razorbilled Auks.

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BIRD STUDIES WITH A CAMERA

WITH INTRODUCTORY CHAPTERS ON THE OUTFIT AND METHODS OF THE BIRD PHOTOGRAPHER

By FRANK M. CHAPMAN

ASSISTANT CURATOR OF VERTEBRATE ZOÖLOGY IN THE AMERICAN MUSEUM OF NATURAL HISTORY, AND AUTHOR OF HANDBOOK OF BIRDS OF EASTERN NORTH AMERICA, BIRD-LIFE, ETC.

WITH OVER ONE HUNDRED PHOTOGRAPHS FROM NATURE, BY THE AUTHOR

NEW YORK
D. APPLETON AND COMPANY
1900

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THIS BOOK

IS DEDICATED TO

MY WIFE,

WHO, BOTH AT HOME AND AFIELD, IS EVER

"MY BEST ASSISTANT."

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You have learnt from the Birds and continue to learn,
Your best benefactors and early instructors.

FRERE'S *Aristophanes.*

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PREFACE

THE practice of photographing birds in Nature is of too recent origin in this country to permit of its being treated authoritatively. The methods which may be employed are so numerous, the field to be covered so limitless, that many years must elapse before the bird photographer's outfit will meet his wants, while the constantly varying details which surround his subjects almost prohibit duplication of experience.

But it is these very difficulties which render all the more imperative the necessity of conference among workers in this fascinating and important branch of natural history. The causes of both success and failure should, through the medium of books and journals, be made accessible to all, thereby shortening this experimental stage of the study of birds with a camera, and hastening the day when the nature of the outfit and methods shall have been settled with more or less definiteness.

It is as a contribution toward this end, and as a means of answering the queries of numerous correspondents, that the following pages, embodying the results of my own experiences, are offered. It is sincerely hoped that they may increase the interest

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in the study of birds in Nature, and at the same time furnish a more profitable and delightful outlet for the hunting instinct than is afforded by the shotgun or rifle.

A large proportion of the Bird Rock pictures and several of those from Pelican Island have appeared in the Century and St. Nicholas respectively, and are here reproduced by the courtesy of the editors of those magazines; others have been previously published in Bird-Lore.

FRANK M. CHAPMAN.

AMERICAN MUSEUM OF NATURAL HISTORY,
NEW YORK CITY, *March, 1900.*

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BIRD STUDIES WITH A CAMERA

WITH INTRODUCTORY CHAPTERS ON THE OUTFIT AND METHODS OF THE BIRD PHOTOGRAPHER

INTRODUCTION

What is Bird Photography?—Bird photography, as I would encourage its practice, does not mean simply photographing birds; it means the use of the camera as an aid in depicting the life histories of birds. A picture of the bird itself is, of course, of the first importance, but any fact in its biography which the camera can be employed to portray is within the province of bird photography.

The Scientific Value of Bird Photography.—There are certain matters, such as a bird's song, its time of migration, etc., which must be set forth with the pen; there are others, such as its haunts, nesting site, nest, eggs, the appearance and development of its young, where the camera is so far ahead of the pen in its power of graphic representation that it is a waste of time to use the former when circumstances permit the utilization of the latter.

A photograph of a marsh or wood showing the favorite haunts of a species is worth more than pages of description. A picture of a bird's nesting site conveys a better idea of the situation than words can possibly give, while in place of such vague phrases as "nest of coarse grasses, weed

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stalks, rootlets, etc., lined with finer materials," we have a faithful delineation of the nest itself. The shape and pattern of markings of the eggs may also be well shown with the camera, while the appearance of the young at birth, their development, and often the manner in which they are fed, may all be portrayed by the camera with a realism which convinces one of the truthfulness of the result.

By the exercise of much patience and ingenuity we may also photograph the adult bird, showing it at rest or in motion, brooding its eggs or caring for its young. Under favorable conditions such pictures may possess an exactness of detail which makes them perfect representations of the original, giving not alone position and expression, but the arrangement of the feathers, and they then have scientific value unequaled by the best productions of the artist's brush or pencil.

From the nature of the case, perfection in this branch of bird photography is not always attained; nevertheless, even pictures which are failures from a photographic standpoint may be of interest to the naturalist. They may be lacking in detail and still give pose, thus furnishing models from which drawings containing all structural essentials may be made.

The camera may also supply us with graphic records of the few large colonies of birds yet existing in this country, thereby preserving for all time definite impressions of conditions which are rapidly becoming things of the past.

What an invaluable addition to the history of the Great Auk would be a series of photographs

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from Funk Island, taken during the period of its existence there!

Of what surpassing interest would be photographs of the former flights of Wild Pigeons, which the younger generations of to-day can with difficulty believe occurred!

The Charm of Bird Photography.—As a one-time sportsman, who yielded to none in his enjoyment of the chase, I can affirm that there is a fascination about the hunting of wild animals with a camera as far ahead of the pleasure to be derived from their pursuit with shotgun or rifle as the sport found in shooting Quail is beyond that of breaking clay "Pigeons." Continuing the comparison, from a sportsman's standpoint, hunting with a camera is the highest development of man's inherent love of the chase.

The killing of a bird with a gun seems little short of murder after one has attempted to capture its image with a lens. The demands on the skill and patience of the bird photographer are endless, and his pleasure is intensified in proportion to the nature of the difficulties to be overcome, and in the event of success it is perpetuated by the infinitely more satisfactory results obtained. He does not rejoice over a bag of mutilated flesh and feathers, but in the possession of a trophy—an eloquent token of his prowess as a hunter, a talisman which holds the power of revivifying the circumstances attending its acquisition.

What mental vision of falling birds can be as potent as the actual picture of living birds in their homes? And how immeasurably one's memories are

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brightened by the fact that this is not a picture of what has been but of what is!

The camera thus opens the door to a field of sport previously closed to those who love birds too much to find pleasure in killing them; to whom Bob-White's ringing whistle does not give rise to murderous speculations as to the number in his family, but to an echo of the season's joy which his note voices. They therefore have a new incentive to take them out of doors; for however much we love Nature for Nature's sake, there are few of us whose pleasure in an outing is not intensified by securing some definite, lasting result.

We are not all poets and seers, finding sufficient reward for a hard day's tramp in a sunset glow or the song of a bird. Enjoy these things as we may, who would not like to perpetuate the one or the other in some tangible form?

And here we have one of the reasons for the collecting of birds and eggs long after the collector's needs are satisfied. He goes on duplicating and reduplicating merely to appease the almost universal desire to possess any admired although useless object. Once let him appreciate, however, the pleasure of hunting with a camera, the greater skill required, and the infinitely greater value of the results to be obtained, and he will have no further use for gun, climbing irons, and egg drill.

Furthermore, the camera hunter possesses the advantage over the so-called true sportsman, in that all is game that falls to his gun; there is not a bird too small or too tame to be unworthy of his attention; nor are there seasonal restrictions to be observed,

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nor temptations to break game laws, but every day in the year he is free to go afield, and at all times he may find something to claim his attention.

Finally, there is to be added to the special charm of bird photography the general charm attending the use of the camera. Thousands of people are finding pleasure in the comparatively prosaic employment of photographing houses, bridges, and other patiently immovable objects wholly at the camerist's mercy. Imagine, then, the far greater enjoyment of successes not only of real value in themselves, but undeniable tributes to one's skill both as photographer and hunter.

Nor should this introduction be closed without due acknowledgment to the educational value of photography, to its power to widen the scope of our vision, and to increase our appreciation of the beautiful. There is a magic in the lens, the ground glass, and the dark cloth which transform the commonest object into a thing of rarest interest.

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THE OUTFIT AND METHODS OF THE BIRD PHOTOGRAPHER

THE BIRD PHOTOGRAPHER'S OUTFIT

THE beginner must not suppose that good bird photographs can be made only with expensive apparatus. Under favorable conditions there is no great difference in the results secured with the ordinary camera and lens of any reputable maker and those of the highest class. My own work has for the greater part been done with an outfit costing about thirty dollars; and although the best lens is, of course, to be desired it is not a necessity, and cost therefore is no more an obstacle to the hunting of birds with a camera than it is to their pursuit with a gun.

The Camera.—Individual taste will doubtless govern the size of the camera chosen, but most naturalists and sportsmen consider the camera carrying a plate four by five inches as the one best adapted to their wants, and with this decision I heartily agree. The advantages of size, weight, and economy, both as regards the camera, its holders, and plates, are all in favor of the 4 × 5, while as far as the bird photographer is concerned, it is not often that he has need of anything larger. The image of a bird will rarely be without adequate setting in a space four

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by five inches, which will also be found to be large enough for the portrayal of nests and eggs.

The 4 × 5 also reduces proportionately in making lantern slides, and if the picture is made the long way of the plate—that is, higher than broad—it can be easily adapted for illustrative purposes in duodecimo or octavo books. When a larger picture is desired it can readily be made by enlargement, an increase in size of three diameters, or six times the area, being possible from a sharp negative without undue loss of definition.

For use from a tripod any one of the several excellent long-focus cameras now on the market will be found to answer every requirement. If it is proposed to employ a telephoto lens, care should be taken to select the camera combining greatest bellows length with rigidity. A reversible back increases the size somewhat but adds to the length of bellows, and will be found serviceable in the many awkward situations in which the bird photographer is often placed by the nature of his subjects.

The Kearton brothers have an "adjustable miniature" on the top of their camera, which they state "is used as a sort of view finder when making studies of flying birds. When fixed in position and its focus has been set exactly like its working companion beneath it, both are racked out in the same ratio by the screw dominating the larger apparatus." * The purposes of this attachment, however,

* From Wild Life at Home, how to Study and Photograph It, by R. Kearton, illustrated by C. Kearton; a work of the utmost interest to the animal photographer, who should also read With Nature and a Camera, by the same authors (Cassell & Co.).

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will, it seems probable, be better served by the reflecting camera described below, while as a finder alone its place may be taken by the "iconoscope" and other of the prism finders, the brilliant image cast by which is such a striking and satisfactory improvement on the hazy outlines given by the average so-called "finder."

For use as a hand-box only two kinds of camera are available, for it must be borne in mind that the set-focus or short-focus, wide angle "snap-shot" cameras, so popular among the button-pressing fraternity, are not adapted to the wants of the bird photographer, who must therefore avail himself of either a twin-lens or a reflecting camera.

Twin-lens cameras are manufactured by several well-known firms, but the trade size is of too short focus to be desirable. In this type of camera two lenses of equal foci are employed. They are set one above the other in bellows, which move as one. The lower lens makes the picture, the upper projects a duplicate of the image cast by the lower lens to a mirror set at an angle of forty-five degrees to the plane of the plate, whence it is reflected upward to a ground glass, which is protected by a hood, on top of the camera.

To focus perfectly the lenses should be "matched" or "paired"—in short, interchangeable—thereby greatly increasing the cost of the camera, which is also rendered objectionable by its large size.

The reflecting camera possesses all the advantages of the twin-lens, but requires only one lens, and when in use is not materially larger than the ordinary 4 × 5 long-focus box.

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The reflecting camera now in my possession was designed and made by John Rowley, of the American Museum of Natural History, and was fully described and illustrated by him in Bird-Lore for April, 1900. It resembles the upper half of the twin-lens camera in that a mirror, set at an angle of forty-five degrees to the plate, is interposed between the latter and the lens, and reflects its image to a ground glass on top of the camera. This mirror, however, is movable, and the desired object appearing in focus on the ground glass, a lever is pressed downward which raises the mirror to the top of the box, where it automatically releases a focal-plane shutter (see beyond, under The Shutter) directly in front of the plate, when the image-bearing rays, before intercepted and reflected by the mirror, are registered on the plate, from which the slide had previously been drawn.

When the focal-plane or curtain shutter has been set and the slide drawn from the plate holder, this camera is like a cocked gun, which may be fired the moment it is sighted; or, in other words, the exposure may be made the instant focus is secured. With this camera one may take advantage of any offering opportunity to secure a picture of a bird or beast when afield, and this fact, by increasing the possibilities of an outing, adds greatly to its pleasure.

Mr. Rowley has so designed this camera that it may be used from a tripod as well as in the hands; but when the tripod camera is to be left, perhaps for hours, hidden near some bird's nest, I prefer to employ the long-focus for this purpose, and retain

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the reflecting camera for possible use on the birds that so often approach closely when one is in hiding. The advantages possessed by this camera are so apparent that it doubtless will soon be placed on the market.

The Lens.—Professional photographers differ so widely in their opinions of the relative qualities of the various makes of lenses now on the market, that I approach this subject with diffidence, and, without presuming to offer advice, present the results of my experience both as to lenses and the requirements of the bird photographer. In regard to the latter phase of the much-discussed question of "What lens shall I use?" I may speak with more confidence. For nests with eggs or young birds—subjects which may be approached closely—a six- to eight-inch-focus lens forms a large enough image, and at the same time gives depth of focus and sharpness of definition without the use of the smaller diaphragms. In photographing birds, however, it is generally difficult to get within "shooting" distance, and at least a fourteen- to sixteen-inch lens is needed in order to secure an image of sufficient size. Depth of focus is here, in my opinion, not desirable, and the focal point—the bird—is brought out more clearly by the fusion of all the objects back of it into a uniform background.

When a bird, either young or old, is the subject, great speed may be required, and sometimes under light conditions which severely test the qualities of the lens. To fully meet these demands of distance and time two lenses would be needed; but, aside from the increased cost and the inconvenience of

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using two lenses, the great size and weight of a long-focus lens are drawbacks. These objections are largely overcome by the use of the symmetrical lenses placed in most of the long-focus boxes, or, if expense be not considered, by a "convertible" lens.

For several years I have used a "Victor" lens, sold with the "Premo" long-focus camera. The combined focus of the front and back lenses is seven and a half inches, of either of the lenses alone, fifteen inches. The single lens therefore, the distance being the same, gives an image double the size of that cast by the two lenses together.

This lens has been thoroughly tested, and many of the pictures given in this book were made with it. When the conditions are favorable and the subject not extremely difficult it yields satisfactory results.

The "convertible" lenses of various makers are also separable, and where the rear and front lenses are of different foci three focal lengths are obtainable. These lenses are of the highest grade, and consequently expensive. In a bright light, or where great speed is not required, they do not seem to be as superior to the trade lens as the much higher price would lead one to expect. But in dull days, or in the shadow, or where extremely rapid exposures are necessary, their superior qualities become evident. My experience with these convertible lenses has been limited to the Zeiss Anastigmat, Series VII *a*, of which I am now using a No. 10 with a combined focus of eight inches, the front and rear lenses both having a focal length of fourteen inches. This combination is preferred to one in which the component lenses are of different foci, because of the

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greater speed of the two when combined, and furthermore, because, being of the same focus, they could, if occasion arose, be used in a twin-lens box. The speed of the combination is registered at F. 6.3; that of the single lenses at 12.5. With the former the most rapid exposures can be made successfully, while the latter are sufficiently fast to permit of ordinary instantaneous work. This lens is stated to cover a $5 \times 8\frac{1}{2}$ plate, and when in use on a 4×5 camera gives a high degree of illumination and perfect definition.

The telephoto lens may be employed in certain kinds of bird photography with not unsatisfactory results. Its disadvantages are lack of speed, an exposure of at least one half a second to a second being required at F. 8 in bright sunlight, the necessity of extreme care in focusing, and of absolute rigidity of the camera at the time of making the exposure. In short, the telephotographer needs more time, both before and after pressing his bulb, than the bird photographer is often accorded. However, with such subjects as nests high in trees or on cliffs, Herons and other shore-inhabiting birds, Ducks on the water or Hawks perched in leafless trees, the telephoto will be found serviceable.

Negatives are frequently secured in which the figure of the bird, while small, is sharp, when, by enlargement, a desirable picture can be made of what in the original was too small to be easily distinguishable. An increase in size of two diameters is possible from any fairly sharp negative, but if the object be in perfect focus an increase of four diameters may be made.

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These enlargements may be made with an enlarging camera or with the aid of a Nehring enlarging lens, which is placed between the front and back lenses of the view lens, when, with the ordinary long-focus camera, a magnification of about four diameters may be obtained, the image being thrown on to a piece of bromide paper in the plate holder.

Through enlargement many apparently worthless negatives become of value, and in some instances pictures can be made from different parts of the same negative. From the sportsman-photographer's standpoint there is, however, one objection to the use of a magnifying lens. It gives deceptive results, and those who are not familiar with its powers are apt to accord the photographer undue praise for his apparent skill in successfully approaching some bird or beast which may have been far out of range. A not wholly unrelated kind of enlargement is sometimes applied to the contents of creels and game bags!

But the animal photographer is so heavily handicapped that in this case the end assuredly justifies the means. As a matter of information, however, it seems eminently desirable to accompany all enlarged pictures by a statement of the extent of their magnification, and throughout this book this plan is followed. Consequently, when there is no mention of enlargement, it may be accepted as a fact that the print from which the reproduction was made was obtained from the negative by contact.

In illustration of these suggestions in regard to the proper lenses for bird photography, a series of pictures is presented which shows the results to be

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obtained under the same conditions with different lenses.

Placing a mounted Flicker (*Colaptes auratus*) on a fence post, and setting up my tripod at a measured

2. Lens Test No. 1. Mounted Flicker on fence post, distance fifty feet. Eight-inch focus, Zeiss Convertible, No. 10, Series VII *a* lens; diaphragm F. 8, 1/25 second; Cramer "Crown" plate. Photographed at noon, in sunlight, November 30, 1899.

distance of fifty feet, a series of test exposures was made, of which three are presented as follows: First,[2] eight-inch lens (Zeiss Convertible Series VII *a*, No. 10), stop F. 8, time $\frac{1}{25}$ second; second,[4] fourteen-inch front lens of the combination, stop F. 16 (equivalent

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to F. 4 of the eight-inch); third,[6] telephoto attachment with eight-inch lens, twenty-one-inch bellows, stop F. 8 of the eight-inch, time one second. Commenting on the results of these tests it may first be

3. The bird in Test No. 1 enlarged about three diameters.

mentioned that in the "Unicum" shutter employed exposures of a so-called "$\frac{1}{100}$" and "$\frac{1}{25}$" seconds gave exactly the same results both with the combined eight-inch lens and the front fourteen-inch lens; the actual time, however, was doubtless not far from $\frac{1}{25}$ of a second. The negatives, therefore, show, in the first place, that the long-focus lens is capable of doing fairly rapid work. Continuing our compari-

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son, we observe that the eight-inch gives a fairly wide field, excellent depth of focus, but a very small image of the bird, for which alone the picture has been made. With the fourteen-inch we decrease the

4. Lens Test No. 2. Same subject, distance, plate, and date as Test No. 1. Front lens (fourteen-inch focus) of Zeiss Convertible, No. 10; diaphragm F. 16; 1/25 second.

extent of the field nearly one half and almost double the size of the object pictured. This, however, has been done at the loss of depth of focus, not even the first of the line of posts running directly into the

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background being sharply defined, while with the eight-inch all are in focus.

The telephoto gives an enlargement of about six diameters of the image thrown by eight-inch lens,

5. The bird in Test No. 2 enlarged about three diameters.

and three diameters increase of that of the fourteen-inch lens. It practically restricts the picture to the immediate surroundings of the bird, and is without focal depth.

Having now made three good negatives in the field, we may, by enlargement, improve on the image of the bird obtained. The possibilities in this direction are clearly shown by the three enlargements

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accompanying the contact prints from their respective negatives. In each instance the enlargement is about three diameters, and the telephoto negative of course furnishes the most satisfactory picture.

6. Lens Test No. 3. Same subject, distance, plate, and date as Tests Nos. 2 and 3. Eight-inch Zeiss Convertible, Series VII *a*, No. 10, with telephoto attachment; diaphragm F. 8; twenty-one-inch bellows; one second ($\frac{1}{2}$ second was later found to be full time).

When the difficulties of telephotography are considered, however, and the $\frac{1}{25}$-second exposure of the fourteen-inch lens, which permits of hand work, is compared with the one second of the telephoto, we believe that for general work in photographing

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birds a lens having a focal length of at least fourteen inches will be found the most satisfactory. It should be added that, in order to make them wholly comparable, the three contact prints as well

7. The bird in Test No. 3 enlarged about three diameters.

as the enlargements were made on enameled bromide paper.

The Shutter.—For fairly rapid, slow, and time exposures, a lens shutter, such as is sold with trade cameras, will be found suitable. Simplicity and noiselessness are the chief requirements in this kind of a shutter. The "Iris Diaphragm" shutter is noise-

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less when used for slow exposures of two or three seconds, a matter of much importance in making time pictures of sitting birds, who are apt to turn their head if they hear the click of the shutter. This shutter, however, does not respond quickly in slow exposures and is very heavy, a disadvantage in telephotography.

The "Unicum" shutter is lighter, responds quickly, has a lever to which a thread may be attached for making exposures from a distance, can be easily diaphragmed from the rear, but is not wholly noiseless. There are also other shutters, each possessing good points of its own, and the selection of any one of them for use in medium rapid, slow, or time work can be left to the photographer, who should, however, remember that the time scales on these shutters represent degrees of difference and not exact measurements of time, and that there is great variation in the exposures of different shutters of the same make when similarly adjusted. Thus the "one fifth of a second" of one shutter may be equivalent to the "one second" of another. The scale on most of these shutters calls for a speed not exceeding a $\frac{1}{100}$ part of a second, but this is far too slow an exposure to successfully photograph a flying bird at short range where a speed of at least $\frac{1}{500}$ of a second is required.

For very rapid work the choice is limited to one kind of shutter—that is, the focal-plane, which in effect is a curtain with an adjustable slit which is placed directly in front of the plate. Great speed with this shutter is in part secured by increasing the tension of the spring, which acts as its motive

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power, but more particularly by decreasing the width of the slit. Assuming, therefore, that it takes one second for the slit to pass from top to bottom of a plate four inches high, and that the slit is one inch in width, it follows that each portion of the plate is exposed to the light for a quarter of a second. Decreasing the width of the slit one half, proportionally reduces the time of the exposure, and by this means, in connection with an increase in the speed with which the curtain is moved, an exposure of $\frac{1}{1000}$ of a second is possible.

In addition to possessing the advantage of great speed, this shutter also passes a higher percentage of light than a lens shutter even when the actual time of the so-called exposure is the same. This is due to the fact that the lens opening is in no way affected, it being the same throughout the exposure. With a lens shutter, on the contrary, the full value of the opening is given for only a fractional part of the exposure, the parts of the shutter more or less filling the opening during the rest of the time. With a focal-plane shutter, therefore, one may do rapid work under conditions where a lens shutter could not be successfully employed; time exposures, however, can not be made with the focal-plane shutter, and for all-around work the camera should be fitted with both a lens and a focal-plane shutter.

The reflecting camera, as before stated, is fitted with a focal-plane shutter, and, as described, it is released by pressing the lever, which raises the mirror. Lens shutters, however, are released by a pneumatic bulb, or in some cases by a thread or

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string. When the exposure is to be made from a distance as much as one hundred feet of tubing may be employed. With any length of over twenty-five feet an extra large bulb is required. The ordinary tubing sold by photographers will not be found so well adapted to long-distance work as a less elastic kind, which does not so readily yield to pressure and transmits a larger portion of the force applied when squeezing the bulb.

The Tripod.—A stout two-length tripod is to be preferred to one of the slender multifolding type, in which stability is sacrificed to weight and size. The legs, except the inner sides of the upper section into which the lower section slides, and brass work should be painted bark color in order to make them as inconspicuous as possible. For use in the water a metal tripod will prove more serviceable than one of wood.

A very useful substitute for a tripod is the "Graphic" ball-and-socket clamp designed more especially for bicycle camerists. With it a camera can easily be attached to the limb of a tree, rung of a ladder, or, by screwing a block on to the head of the tripod, it may be employed in connection with the tripod—in fact its applicability will be evident to every one using it.

Plates.—Among the many excellent brands of plates now offered to photographers there is really very little difference. However, it is advisable to select the one you think the most rapid and use it to the exclusion of all others. Under certain circumstances—in photographing Robins, for instance—isochromatic plates will be found desirable, and

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where a strong head light can not be avoided non-halation plates may be employed.

So much industry, skill, and patience are generally required of the bird photographer before he makes an exposure that he should guard against all chances of failure from the photographic side. It is therefore advisable to thoroughly test plates which it is probable may be exposed on a very difficult subject. Under no circumstances should the plate holders be needlessly exposed to the light, and when the camera is to be left for an indefinite period with the slide drawn from the holder and plate ready to expose, it should be carefully wrapped in the dark cloth.

Blinds.—As the sportsman constructs blinds in which he may conceal himself from his prey, so the bird photographer may employ various means of hiding from his subjects. The Keartons recommend an artificial tree trunk for use in wooded places and an artificial rubbish heap for open fields. The former may be made of light duck, painted to resemble bark, and placed over a frame.

The frame of the Keartons' is of bamboo, but I find white pine answers very well, the main things to be considered being lightness and portability. The frame should therefore be collapsible in order that it may be easily packed.

The Keartons' field blind or "rubbish heap" consists of an umbrella, to each of the ribs of which strips of bamboo four feet in length are tied. This is then covered with light brown holland and wisps of straw tied over it in such a way as to "virtually thatch the whole structure." Doubtless cornstalks

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properly arranged would make an excellent field blind.

It is difficult to carry one of these blinds in addition to a camera, etc., without assistance, and I fear that the inconvenience attending their use will restrict them to the few enthusiasts who count neither time, labor, nor cost in attaining a desired end.

For my own part, I prefer, when possible, to conceal my camera and make the exposure from a distance rather than to weight myself with a portable blind and to endure the discomforts of being confined within it.

Sundries.—The bird photographer will find that he requires numerous articles not usually to be found in the regulation photographic outfit, as, for example, climbers for ascending trees and stout cords for hauling the camera up after him; a dark-cloth, green in color, to aid in disguising the camera, and a mirror. The latter should be of plate glass, and measure at least twelve by ten inches. A good plan is to buy a piece of glass of desired size and frame it simply in white pine. It may then be attached to a limb, a stick driven in the ground, or other convenient object, by means of the ball-and-socket clamp mentioned under Tripods, which may be screwed into the back or the outer border of the frame. Such a mirror will reflect sunlight many yards to shaded nests, where, in photographing old or young birds, a quick exposure is necessary. A vest-pocket mirror, for use in reflecting the reading of the diaphragms or time on the shutter, will permit one to make the desired changes from the rear, and thus prove help-

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ful when conditions do not permit one to work in front of the camera.

A device which might be arranged on the principle of a trap, the trigger to be sprung and exposure made when the bait is taken, would doubtless capture some interesting pictures. An apparatus connected with an automatically fired flash-light, has been employed by Mr. G. A. Shiras, of Pittsburg, in photographing deer at night, with phenomenal success. The connection with the camera shutter was so made that the deer, in walking, touched a cord which exploded the flash-light, and, at the same moment, made the exposure. The light weight of most birds, however, requires a much more delicate apparatus, while an even greater difficulty is found in the movement caused by the release of the trigger, which startles the bird just as the exposure is made.

Thus far in my experiments I have been unable to overcome these objections, but I trust some other bird photographer will be more successful.

Those who are ambitious in the direction of cliff photography I would refer to the Keartons' admirable treatise on the subject in their Wild Life at Home, for a description of the paraphernalia needed and the manner in which it should be used. My own experience in this line is limited, and I confess to the utter absence of a desire to increase it!

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THE METHODS OF THE BIRD PHOTOGRAPHER

CLAIMING no special knowledge of the technique of pure photography, I would refer the beginner to any of the several excellent books designed to explain the rudiments of optical and chemical photography, and to instruct in regard to the matters of exposing, developing, printing, etc. Only such suggestions are given here, therefore, as relate directly to the manner in which birds, their nests, eggs, and haunts may be photographed.

Haunts. — Photographs of the characteristic haunts of birds should show not alone general topography, but should also be made with special reference to the bird's feeding habits, which, more than anything else, govern the nature of the locality selected. Thus, a photograph of the home of the Woodcock would have added value if, in the immediate foreground, the "borings" made by this bird in probing the earth for food were evident; or a marsh scene, in which wild rice was conspicuous, would tell something of both the haunts and the food habits of the Reedbird and Red-winged Blackbird in August and September. In a similar way, pictures of wild cherry and dogwood trees, of bayberries and red cedar, which show both fruit and

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surroundings, are of interest in connection with the biographies of many birds.

Seasons.—The camera permits us to make so exact a record of the rise and fall of the year, as it is registered by vegetation, that we can actually compare existing conditions with those which prevailed at any previous time. Compare, for example, the series of four pictures[8-11] here presented, all made from the same point of view, in order to appreciate how graphically seasonal changes may be shown by the camera. In this instance, photography is of more service to the botanist than to the ornithologist; but every student of migration knows how closely related are the appearance of certain birds and flowers, and will readily appreciate, therefore, the value of a series of photographs of several different subjects, taken at short intervals, and showing the changes in vegetation due to the approach of summer or winter. In connection with such related phenomena as temperature, rainfall, and weather, these pictures form as accurate a record of the sea-

8. Spring.

9. Summer.

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sons as it is possible to make, and if data of this kind could be brought together from many selected localities, we should have an admirable basis for the intelligent study of certain phases of bird migration.

Nests and Eggs.—The photographing of nests is one of the simpler forms of bird photography, but in many instances success is achieved only through the exercise of much patience and ingenuity.

10. Autumn.

It should constantly be borne in mind, in photographing nests, that what is desired is not so much a picture of the nest alone as one which shows it in relation to its environment —in short, a picture of the nesting site is of more value than one of the nest only. It is advisable, however, to make at least three pictures, two[12, 13] of which shall show the nature of the locality chosen, the other[14] the character of the nest and its immediate surroundings. When the nest is not above five feet from the ground, little difficulty will be experienced in securing the desired picture. When on the ground it will sometimes be found helpful to put what naturally would be the rear

11. Winter.

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leg of the tripod forward, *between* the other two, when it will serve as a brace from in front, and permit the camera to be tilted well downward without danger of its falling.

Nests at an elevation of seven or eight feet, in saplings, may be photographed by lengthening the tripod with short legs, each supplied with two sta-

12. To show nest locality of: 1, Tree Swallow; 2, American Bittern; 3, Song Sparrow; 4, Maryland Yellow-throat; 5, Marsh Hawk, of which nesting site, nest, and young are shown in the two following pictures, Nos. 13 and 14. Meridian, N. Y., June 8, 1898.

ples or collars into which the ends of the tripod may be slipped; or a ladder or light scaffolding will sometimes be found necessary.

For photographing nests in trees the "Graphic" ball-and-socket clamp is of great assistance. With it the camera may be attached to a limb, or, if the limb is too large, a block may be nailed to it, thus

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furnishing a grip to which the clamp may be fastened.

Nests should be photographed from the side, but

13. Nesting site, nest, and young of Marsh Hawk.

eggs should be photographed from above in order to show their position in the nest as they were arranged by the incubating bird. The nest should

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therefore never be tipped, nor should the eggs be touched, lest the value of the subject be destroyed. The markings of most birds' eggs are already well known, but if photographs of them are desired they can be made from the thousands of eggshells with which ill-directed effort has stocked the cabinets of misguided oölogists.

14. Young Marsh Hawks and nest.

It is not advisable to make photographs of nests in the sunlight, a diffused light giving greater detail. A screen of some thin white material should therefore be used as a shade when photographing nests exposed to the direct rays of the sun. This, however, will not be found necessary if the picture be made within two or three hours after sunrise,

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when the light is soft and the foliage comparatively motionless, permitting the use of a small diaphragm and a long exposure.

Young Birds.—The ease with which photographs of young birds may often be secured, the fact that with the camera their appearance and development may be more satisfactorily recorded than in any other way, makes their study by the photographer of exceeding importance. Photographs of young birds should of course be accompanied by notes on food, calls, special actions, etc., which the camera can not well portray.

15. Young Great-crested Flycatcher.

The young bird is a worthy subject from the moment it leaves the shell until, as far as flight is concerned, it deserves to be ranked with its elders. When possible, series of pictures should be made showing the rate of growth of the same brood from the period of hatching to the date when the nest is deserted. Circumstances do not, however, often permit of the forming of these ideal series, and we must therefore photograph the young bird as we find him, either before or after[15] he has made his initial flight, or as he is preparing for it.[16]

The suggestions made under the head of Birds'

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Nests and Eggs will apply in a general way to photographing young in the nest; but even when at rest in other respects, the rapid respiration of nestlings requires a quick exposure to insure sharpness of outline, and, when in the shadow, sufficient illu-

16. Young Baltimore Orioles and nest.

mination can be secured only with the aid of a reflector.

Adult Birds.—It is in photographing birds in the full possession of the powers of maturity that the bird photographer's skill and patience are put to the most severe tests. It might be said that, from a strictly ornithological point of view, the results obtained do not in many instances justify the time expended. Success, however, in this field, as in many others, is not to be measured by the attainment of a certain end, but often by the experience gained in what, to one having only the ultimate object in view, may seem to have been fruitless effort.

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In matching one's ability as a hunter against the timidity and cunning of a bird, relations are established between the photographer and his subject which of necessity result in their becoming intimately associated.

Doubtless we shall never know just what birds think of the peculiar antics in which the camera

17. Wood Thrush on nest.

enthusiast sometimes indulges, but certain it is that an attempt to photograph some of the most familiar and presumably best-known birds will open the photographer's eyes to facts in their life histories of which he was previously in utter ignorance.

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As a known and fixed point to which the bird may be expected to return, the nest offers the best opportunity to the bird photographer, and photographs of adult birds on or at their nests are more common than those taken under other conditions.[17, 18]

Birds vary greatly in their attitude toward a camera which has been erected near their homes; some species paying little attention to it, and, after a short time, coming and going as though it had always been there, while others are suspicious of any object which changes the appearance of their surroundings.

18. Chestnut-sided Warbler on nest.

With the latter special precautions are necessary, and unusual care should be taken in working about their nests lest they be made to desert it. The long-focus lens is here of great service, for it enables one to secure a sufficiently large image from a distance of ten or twelve feet. Even then it will often be necessary to conceal or disguise the camera by covering it with the green dark-cloth, vines, and leaves. A rubber tube or thread of requisite length is then attached and the exposure is made from a distance.

A dummy camera, composed of a box or log wrapped in a green cloth and placed on a tripod

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made from saplings, may sometimes be erected to advantage several days before one expects to attempt to photograph the bird, who in the meantime becomes accustomed to it and quickly returns to the nest after the real camera has been substituted.

The artificial tree trunk would doubtless be of assistance in some kinds of bird-at-the-nest photography, especially when one desired to secure pictures of the old bird feeding its young, and was obliged therefore to make the exposure at just the proper moment. In most instances, however, there is sufficient undergrowth in the immediate vicinity to afford concealment, from which with the aid of a glass one may take note of events.

With the reflecting camera one may stalk birds on foot or with a boat, or "squeak" them into range by kissing the back of the hand vigorously, a sound which, during the nesting season especially, arouses much curiosity or anxiety in the bird's mind.

The decoys, blinds, batteries, sneak boxes, etc., of the sportsman are also at the disposal of the hunter with a camera, though I must admit that my one outing to photograph bay birds over decoys resulted in an empty bag. It was in the spring, however, when the bay birds surviving had experienced two shooting seasons and were exceedingly wild. In the fall, with birds born the preceding summer, one might be more successful.

Birds may be sometimes brought within range of the camera by baiting them with food, and, after they have learned to expect it, placing the camera in suitable position. This may be most easily done when there is snow on the ground, at which

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time hunger makes most birds less suspicious of danger.

From a considerable experience which, through poor equipment, has not yielded adequate return, I am convinced that one may secure excellent pictures of many birds by decoying them with either a mounted

19. Catbird scolding.

or living Owl; doubtless the latter would be preferable, though I have never tried it. With a poorly mounted Screech Owl, however, I have had some excellent opportunities to photograph. My plan is to select some spot where birds are numerous, preferably near the home of a Catbird,[19] place the Owl in a conspicuous position, and erect near it a "scolding perch," from which the protesting bird may con-

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veniently vituperate the poor unoffending little bunch of feathers with its staring yellow eyes. The camera is then focused on the scolding perch and the photographer retires into the undergrowth, and, bulb in hand, waits for some bird to take the desired stand.

A Catbird's domain is chosen for the reason that this species is the alarmist of whatever neighborhood it may inhabit, and once its attention has been attracted to the Owl by "squeaking" or uttering the alarm notes of other birds, the photographer may subside and let the Catbird do the rest.

The bird's rage is remarkable, its fear painful. Should the Owl be near to the Catbird's nest it will utter notes in a tone of voice I have never heard it use on other occasions. It loses all fear of the camera, and from the scolding perch screams at the Owl with a vehemence which threatens to crack its throat. One is glad to remove the offending cause.

Other birds in the vicinity are of course attracted, and hasten to learn the meaning of the uproar. Often a bit of undergrowth, of which the Catbird was apparently the only feathered tenant, will be found to possess a large bird population. It is interesting to observe the difference in the actions of various birds as they learn the reason of the disturbance. On the whole, each species displays its characteristic disposition in a somewhat accentuated manner. The Blue-winged Warblers flit to and fro for a few moments and then are gone; the Chestnut-sided Warbler is quite anxious; the Maryland Yellow-throat somewhat annoyed; the Ovenbird decidedly concerned; the Towhee bustles about, but

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seems to pay no especial attention to the Owl; the Wood Thrush utters its sharp *pit-pit*, but is content to let well enough alone if its own nest be not threatened; and the Yellow-throated, Red-eyed, and White-eyed Vireos, particularly the latter, add their complaining notes to the chorus of protests. Not one, however, approaches the Catbird in the force of its remarks, nor does the bird cease to outcry so long as the Owl is visible.

It is felt that in the foregoing suggestions the methods which may be employed by the bird photographer are very inadequately described, but, as was remarked in the preface of this volume, the constantly varying circumstances attending his work practically prohibit duplication of experience.

In truth, herein lies the great charm of animal photography. We have not to follow certain formulæ, but each subject presents its own individual requirements, making the demands on the naturalist's skill and patience limitless and success proportionately valuable.

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BIRD STUDIES WITH A CAMERA

BIRD PHOTOGRAPHY BEGINS AT HOME

THE influence exerted by the camera in creating new values for the bird student is perhaps nowhere more evident than in the immediate vicinity of one's home. Even the view from our windows possesses fresh significance as we speculate on the probability of securing a desirable picture from this or that point of vantage, while birds to which long familiarity has partially dimmed our vision now become possible subjects for our camera, and we find ourselves observing their movements with an alertness before unknown.

In my own case, I have learned almost to tolerate the House Sparrows, with which I have been at war as long as memory serves me, for the pleasure found in attempting to outwit these shrewd, independent, impudent rats among birds; and, on closer acquaintance, they prove such interesting subjects for study that, if their vocal ability equaled their intelligence, they might be as generally liked as they are hated. So much for the magic of a sweet voice. As it is, they possess a greater variety of notes than they are generally credited with, and their conversational powers undoubtedly exceed those of many accom-

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plished singers. In addition to the insistent, reiterated *chissick, chissick,* which constitutes the song of the male, one soon learns to recognize calls of warning, alarm, flight, battle, and the soft whistle which the bird utters when it approaches its nest—the only musical note in its vocabulary.

Quick to notice the slightest deviation from normal conditions, House Sparrows are difficult birds

20. House Sparrows and Junco.

to photograph. They seem to be constantly on the watch for some sign of danger, and an unusual arrangement of blind or shade at once arouses their suspicions. After a heavy fall of snow, however, hunger dulls the edge of their fears, and by scattering food near a suitable window the birds may be decoyed within photographing distance.[20] It will be found necessary, even then, to conceal the camera,

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which they evidently distinguish from familiar pieces of furniture and regard with alarm.

This, too, is the best time to secure pictures of Juncos,[21] Chickadees, Nuthatches, Downy Woodpeckers, Blue Jays, and less common winter birds. The four last named are rarely or never seen about my home in winter. Doubtless the abundant and surrounding woodlands afford them a more congenial haunt, from which they are not to be enticed by suet, bones, or grain; or, more likely still, the custom of putting out food for birds is so unusual in the region about New York city that they have not yet learned to expect it. It is a most pleasing surprise to the

21. Junco. × 3.

resident of this section to observe the numbers and familiarity of winter birds in the environs of Boston, where a feast seems spread for them in nearly every dooryard.

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To return to the Sparrow. The bird's nest also provides a focal point for the camera, but, as elsewhere, the greatest precautions must be taken, and I have succeeded in securing a picture only when some advantageously situated window afforded a natural blind. One of the pictures thus obtained shows a nest in the ornamental part of a gutter, with the female looking from an adjoining opening.[22] This gutter seems especially designed to furnish lodgings for Sparrows, and no argument that I have thus far advanced has convinced them that it was not erected for their use. During the early part of their occupancy, a rap on their roof promptly brought them out to perch in the branches of the neighboring trees, where their chattering protest was soon interrupted by a gunshot; but the survivors quickly learned the meaning of the roof tap, and now, without a moment's pause, they dive downward from their doorway and fly out of range at topmost speed.

22. Female House Sparrow and nest. × 3.

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More welcome tenants than the House Sparrows are a pair of Screech Owls, who for years have reared their broods in a dovecotelike gable, where they are beyond the reach of nest robbers of all kinds. During the winter they apparently are absent, nor indeed are they seen until June, when, each evening at sundown, one of the pair, probably the

23. Screech Owl. × 3.

male, takes his post at the entrance to its home and gives utterance to the crooning refrain which sometimes follows the so-called tremulous "screech." But the latter I never hear at this season. In spite of the poor light prevailing at this hour, the bird's stillness has tempted repeated trials to secure its picture, and the most successful, made with a four-

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teen-inch lens and an exposure of fifteen seconds, is here shown.[23] Telephotos have thus far been underexposed.

As a means of making the exposure as soon as possible after the Owl appeared, I have on a number of occasions placed my camera in position, focused and otherwise made ready some minutes before he was expected, and I recall with amusement the incredulity of a friend whose surprise at seeing me point my camera skyward without ostensible purpose was in no way lessened when I told him that I had an appointment with an Owl, who was to take his stand shortly in the hole toward which the camera was directed; and fortunately the bird was on time!

From the perch, some forty feet aloft, the grave little creature surveys the scene below with an expression of combined wisdom and thoughtfulness which makes a laugh seem wanton foolishness. At the border of dusk and dark he flies out to feed, often descending to the ground and remaining there for some moments while catching insects. Occasionally he takes his prey from the tree trunks, perhaps a cicada struggling from its shell, and on several occasions I have thought he captured food on the wing. Sometimes the supper hunt leads him to the edge of the croquet lawn, where from the earth or the back of a garden bench he becomes an interested spectator of the last game. When the young appear, later in the month, the evergreens seem alive with Owls, who flit about and utter querulous little calls difficult of description. Toward the end of July, doubtless after the molt is completed, presum-

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ably the adults—for never more than two are heard—begin to sing; and this habit of post-nuptial singing seems not to be confined to the Screech Owl, for about this time the deep-toned, resounding notes of the Barred Owl come up from the woods. Throughout August and September the wailing whistle, which is ever welcome for its spirit of wildness, is heard nightly, and as the plaintive notes tremble on the hushed air we invariably say, "Hark, there's the Owl!"

My experience as bird photographer about home, I must admit, has consisted chiefly in a series of encouraging failures which have borne no tangible results. Let us hope, however, that the few pictures here presented will prove as suggestive to the reader as they are to their maker, who, although he offers such inadequate proof in support of his belief, is far too well convinced of the possibilities of home photography to go afield without saying at least a word in its behalf.

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THE CHICKADEE

A Study in Black and White

ERY early in my experience as a hunter I became acquainted with a small black-and-white bird, who not only announced himself with unmistakable distinctness, but did so at such close range that one could form a very clear idea of his appearance; and thus because of his notes and trustfulness I learned to know the Chickadee by name years before I was aware that the woods were tenanted by dozens of other more common but less fearless birds.

With regret for the universality of the instinct, I found that to see was to desire. I had felt exactly the same longing in regard to other birds, and had thrown many a stone in a fruitless effort to get possession of the half-mysterious wild creatures which always eluded me; but the Chickadee came within range of my bean-shooter and soon paid the penalty of misplaced confidence. The little ball of flesh and fluffy feathers was perfectly useless, so after a day or two, the length of time depending on the temperature, it was thrown away.

My curiosity concerning the Chickadee being satisfied, and the bird's tameness making it too easy

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a mark even for a bean-shooter, I entered on a new phase of Chickadee relations. Strangely enough, the killing of the bird seemed, from my point of view, to constitute an introduction to a creature which before I had known only imperfectly, and my acquaintance with the Chickadee may be said to have begun when I picked up the first bird that fell before my aim. However the Chickadee may have regarded my somewhat questionable manner of gaining his friendship, he has since given unmistakable evidences of his approval of my treatment of his kind. He always replies to my greeting, often coming many yards in answer to my call, and on a number of occasions he has honored me above most men by alighting on my hand.

When, in more recent years, the gun which succeeded the bean-shooter was in turn replaced by a camera, I found that the Chickadee's tameness made him a mark for my later as he had been for my earlier efforts in bird hunting. Now, however, I believe I may speak for him as well as for myself, and say that the results obtained are more satisfactory to us both. It was in Central Park, New York city, in February, 1899, that I went on one of my first Chickadee hunts with a camera. Incidentally the locality gave emphasis to the advantages of the camera over any other weapon. Imagine the surprise of the park police had I ventured on their precincts with a gun on my shoulder! But with a camera I could snap away at pleasure without any one's being the wiser—many of my "snaps," I confess being attended by exactly this result. At this time, through the efforts of an enthusiastic and patient

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bird lover, who had improved on the bird-catching legend by using nuts instead of "salt" and by substituting bill for "tail," three Chickadees in the Ramble had become so remarkably tame that they would often flutter before one's face and plainly give expression to their desire for food, which they took from one's hand without the slightest evidence of fear. Sometimes they even remained to pick the nut from a shell while perched on one's finger, anon

24. Chickadee on ground.

casting questioning glances at their host; but more often they preferred a perch where they could give their entire attention to the nut which was held between their feet, and pecked at after the manner of Blue Jays.

In spite of the ease with which one could approach these Chickadees, they made difficult marks for the camera. I was armed with a "Henry Clay" 5 × 7 and a twin-lens camera of the same size, but

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so active were the little creatures that not one of many exposures proved to be perfectly focused. Finally I tried decoying the birds to a bone or bit of bread in the bushes, but somehow they did not

25. Chickadee taking piece of bread.

succeed in discovering these baits until they were placed on the ground.[24, 25] Then they responded so quickly that often the bread had disappeared while my head was concealed by the dark-cloth, and frequently, while focusing, the birds would alight on the tripod of the camera. I was forced, therefore, to focus on a stone, and, when ready to make the exposure, lay a bit of bread on or near the focal point, the two pictures given being thus obtained.

Various experiences with these unusually tame birds finally led to what at first thought would have been considered the wholly unreasonable ambition of photographing one of them in my hand. The camera was therefore erected at a suitable point and

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focused on the trunk of a tree, the shutter set, and slide drawn.

Now to get the bird. None was in the immediate vicinity, but a whistle soon brought a response from some neighboring tree tops, and going beneath them I shortly had called the bird down to a nut in my palm, and with him on my finger started to walk the eighty or more feet to the camera. This, however, was asking too much, and the bird abandoned his moving perch for a bordering row of evergreens, from which one or two more trials brought him within a short distance of the desired spot, and rest-

26. A bird in the hand.

ing my arm against the tree trunk and with the other hand on the trigger of the shutter I called again the two plaintive notes. The bird's faith was still strong. Almost immediately he took the de-

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sired position, when a *click* announced the realization of a bird photographer's wildest dream.

Fortunate is the bird photographer who discovers an advantageously situated Chickadee's nest. Dr. Robert's charming description in Bird-Lore of his experience with a family of Chickadees stimulated my desire to make a camera study of this species. The first nest found, however, was claimed by a band of roving boys, who in pure wantonness pushed down the stub from which a few days later the young would have issued.

A second time I was more fortunate. It was on the morning of May 29, 1899, at Englewood, N. J., that in going through a young second growth I chanced to see a Chickadee, who in arranging her much-worn plumage gave unmistakable evidence of having recently left her nest. At once I looked about for a partly decayed white birch, a tree especially suited to the Chickadee's powers and needs. The bark remains tough and leathery long after the interior is crumbling, and having penetrated the outer shell the Chickadee finds no difficulty in excavating a chamber within.

A few moments' search revealed a stub so typical as to match exactly the image I held in my mind's eye, with an opening about four feet from the ground. The interior was too gloomy to enable one to determine its contents, but, returning in half an hour, I tapped the stub lightly, when, as though I had released the spring of a Jack-in-a-box, a Chickadee popped out of the opening and into a neighboring tree. I wished her good morning, assured her that

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my intentions were of the best, and promised to return and secure her portrait at the first opportunity.

Four days later I set up my camera before the door to the Chickadee's dwelling, and, without attempting to conceal it, attached thread to the shutter and retreated in the undergrowth to a distance of about twenty-five feet.

After having had most discouraging experiences with several birds, who had evidently regarded the camera as a monster of destruction, and had refused to return to their nests as long as the evil eye of the lens was on them, it was consoling to find a bird who had some degree of confidence in human nature as represented by photographic apparatus.

It is true that the female—and throughout this description I assume that the bird with much-worn plumage was of this sex—promptly left the stub at my approach; but when I retired to the undergrowth there was no tiresome wait of hours while the bird, flitting from bush to bush, chirped suspiciously, but almost immediately she returned to her home.[27] The camera was examined, but clearly not considered dangerous, its tripod sometimes serving as a step to the nest entrance. The click of the shutter, however, when an exposure was made as the bird was about to enter its dwelling, caused some alarm, and she flew back to a neighboring tree, and for some time hopped restlessly from limb to limb.

The male, who had previously kept in the background, now approached, and, as if to soothe his troubled mate, thoughtfully gave her a caterpillar. She welcomed him with a gentle, tremulous flutter-

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ing of the wings—a motion similar to that made by young birds when begging for food. He, however, made what appeared to be precisely the same movements when she perched beside him.

27. Chickadee at nest hole.

It was not long before the female became so accustomed to the snap of the shutter that in order to prevent her from entering the nest I was forced to rush out from my hiding place; but at last, apparently becoming desperate, she succeeded in returning to her eggs in spite of my best efforts to prevent her.

There now ensued a very interesting change in the bird's action. It will be remembered that at first she had left the nest on hearing me approach, while a light tap brought her through the opening with startling promptness. But now, evidently realizing that a return to her duties of incubation could be made only at great risk, she determined under no conditions to leave her eggs. In vain I rapped at

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her door and shook her dwelling to its foundations; no bird appeared, and not believing it possible that under the circumstances she would remain within the stub, I felt that she must have left without my knowledge, and therefore retired to await her reappearance.

28. Chickadee at nest hole.

At the end of several minutes the male, with food in his bill, advanced cautiously, and clinging to the rim of the nest opening, hung there a moment and departed minus the food. This was surprising. Could there be young in the nest? or was the bird, in imitation of the Hornbill, feeding his imprisoned mate? I rapped again, and this time, perhaps taken unawares, the female answered my question by appearing.

On June 3d a family arrived in the Chickadee villa, and both birds were found actively engaged in administering to its wants.

As a return for the inconvenience to which they had been subjected, a perch was erected by way of a step at their door. The female was appreciative and

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at once availed herself of this means of entering her home.[28] The male, however, as before, was more wary. He had braved the camera to bring food to his mate, but his offspring had apparently not so strong a claim upon him. He would fly off in search of food and shortly return with a caterpillar, then perch quietly for several minutes a few yards from the nest, when, repelled by the camera and attracted by the food in his bill, he yielded to temptation, devoured the caterpillar, vigorously wiped his bill, at once started to forage for more food, and returned with it only to repeat his previous performance.

Occasionally he uttered a low whistle, addressed presumably to the female, and at times a *chickadee-dee-dee*, which I interpreted as a protest to me, and both notes were also uttered by the female.

The latter took so kindly to the doorstep that it was determined to give her a door, and to this end a leaf was pinned over the entrance to her home in such a manner that it swung to and fro, like the latch to a keyhole. This clearly did not meet with her approval, and at first she seemed puzzled to account for the apparent disappearance of the nest opening. But in less than a minute she solved the mystery, pushed the leaf to one side, and disappeared within.

Returning to the nest on June 12th, nothing was to be seen of either parent, and I feared that they or their offspring had fallen victims to the countless dangers which beset nesting birds and their young. Looking about for some clew to their fate, I found on the ground, near the nest stub, the worn tail-feathers of the female bird. The molting season had not

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yet arrived, nor would she have shed all these feathers at the same moment. There could therefore be only one interpretation of their presence. Some foe —probably a Sharp-shinned or Cooper's Hawk, since the predaceous mammals for the most part hunt at night, when the Chickadee would be snugly sleeping in her nest—had made a dash and grasped her by the tail, which she had sacrificed in escaping. A moment later the theory was supported by the appearance of a subdued-looking Chickadee, *sans* tail, and I congratulated her on her fortunate exchange of life for a member which of late had not been very decorative, and of which, in any event, Nature would have soon deprived her.

The young proved to be nearly ready to fly, and, carefully removing the front of their log cabin, a sight was disclosed such as mortal probably never beheld before and Chickadee but rarely.

Six black-and-white heads were raised and six yellow-lined mouths opened in expressive appeal for food. But this was not all; there was another layer of Chickadees below—how many it was impossible to say without disentangling a wad of birds so compact that the outlines of no one bird could be distinguished. A piazza, as it were, was built at the Chickadees' threshold in the shape of a perch of proper size, and beneath, as a life net, was spread a piece of mosquito bar. Then I proceeded to individualize the ball of feathers; one, two, three, to seven were counted without undue surprise, but when an eighth and ninth were added, I marveled at the energy which had supplied so many mouths with food, and at the same time wondered how many

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caterpillars had been devoured by this one family of birds.

Not less remarkable than the number of young—and no book that I have consulted records so large a brood—was their condition. Not only did they all appear lusty, but they seemed to be about equally developed, the slight difference in strength and size which existed being easily attributable to a differ-

29. A Chickadee family.

ence in age, some interval doubtless having elapsed between the hatching of the first and last egg.

This fact would have been of interest had the birds inhabited an open nest, or a nest large enough for them all to have had an equal opportunity to receive food; but where only two thirds of their number could be seen from above at once, and where a very little neglect would have resulted fatally, it seems remarkable that one or more, failing to receive his share of food, had not been weakened in conse-

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quence and crushed to death by more fortunate members of the brood. Nor was their physical condition the only surprising thing about the members of this Chickadee family: each individual was as clean as though he had been reared in a nest alone, and an examination of the nest showed that it would have been passed as perfect by the most scrupulous sanitary inspector. It was composed of firmly padded rabbit's fur, and, except for the sheaths worn

30. A Chickadee family.

off the growing feathers of the young birds, was absolutely clean. Later, I observed that the excreta of the young were inclosed in membranous sacs, which enabled the parents to readily remove them from the nest.

The last bird having been placed in the net, I attempted to pose them in a row on the perch before their door. The task reminded me of almost forgot-

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ten efforts at building card houses, which, when nearly completed, would be brought to ruin by an ill-placed card. How many times each Chickadee tumbled or fluttered from his perch I can not say. The soft, elastic net, spread beneath them, preserved them from injury, and bird after bird was returned to his place so little worse for his fall that he was quite ready to try it again. Finally, eight birds were induced to take the positions assigned them; then, in assisting the ninth to his allotted place, the balance of a bird on either side would be disturbed, and down into the net they would go.

These difficulties, however, could be overcome, but not so the failure of the light at the critical time, making it necessary to expose with a wide open lens at the loss of a depth of focus.

The picture presented, therefore, does not do the subject justice. Nor can it tell of the pleasure with which each fledgeling for the first time stretched its wings and legs to their full extent, and preened its plumage with before unknown freedom.

At the same time they uttered a satisfied little *dee-dee-dee,* in quaint imitation of their elders. When I whistled their well-known *phe-be* note, they were at once on the alert, and evidently expected to be fed.

The birds were within two or three days of leaving the nest, and, the sitting over, the problem came of returning the flock to a cavity barely two inches in diameter, the bottom of which was almost filled by one bird.

I at once confess a failure to restore anything like the condition in which they were found, and

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when the front of their dwelling was replaced, Chickadees were overflowing at the door. If their healthfulness had not belied the thought, I should have supposed it impossible for them to exist in such close quarters.

A few days later their home was deserted, and, as no other Chickadees were known to nest in the vicinity, I imagine them to compose a troop of birds which is sometimes found in the neighborhood.

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THE LEAST BITTERN AND SOME OTHER REED INHABITANTS

Y experience with the Least Bittern leaves the eerie little creature a half-solved mystery, and I think of it less as a bird than as a survivor of a former geological period, when birds still showed traits of their not distant reptilian ancestors.

The Bittern's home is in fresh-water, cat-tail marshes, and he wanders at will through the thickly set forest of reeds without of necessity putting foot to the water below or flapping wing in the air above. His peculiar mode of progression constitutes one of his chief characteristics. The reeds in which he lives generally grow in several feet of water, far too deep, therefore, to permit of his wading; while his secretive disposition makes him averse to appearing in the open, except after nightfall. It is impossible to fly through the cat-tails, and so the bird walks and even runs through them, stepping from stem to stem with surprising agility. I had heard of this habit, but the description conveyed as little idea of the bird's appearance as it is feared this one will, and when for the first time a Least Bittern was seen striding off through the reeds about three feet above the water, the performance was so entirely unlike

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anything I had ever seen a bird do before, I marveled that his acrobatic powers had not made him famous.

The feathered gymnast's slender body—or perhaps one should say neck, for the bird is chiefly neck and head—seemed to be mounted on long stilts, with the aid of which he waded rapidly through the water, his head shooting in and out at each stride.

The Least Bittern's notes appear to be less known than his habits. Nuttall, that exceptionally keen-eared bird student, was familiar with them, but most writers have restricted themselves to the statement that, when flushed, the bird utters a low *qua,* while some have even said he was voiceless.

I should not be in the least surprised to learn that this uncanny inhabitant of the reeds had a call fully as remarkable as the vocal performance of his large relative, the American Bittern, but thus far in my slight acquaintance with him he has been heard to utter only four notes: A soft, low *coo,* slowly repeated five or six times, and which is probably the love song of the male; an explosive alarm note, *quoh;* a hissing *hah,* with which the bird threatens a disturber of its nest; and a low *tut-tut-tut,* apparently a protest against the same kind of intrusion.

It was the markedly dovelike *coo* which first introduced me to this species. With William Brewster I was at the Fresh Pond marshes, listening for the repetition of some strange calls which had excited the curiosity of Cambridge ornithologists, and which proved to belong to a Florida Gallinule,*

* See Brewster, Auk, vol. viii, 1891, p. 1.

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when we heard the soft notes of a Least Bittern, who soon rose from the marsh near by. A few days

31. Least Bittern's nesting site, showing reeds bent over nest. One of four eggs can be seen.

later the Bittern was found in full song—if the *coo* be its song—in the marshes of Presque Isle in Erie

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Bay; but it must be confessed that a desire to secure specimens of this, to me, strange bird left no opportunity to study its habits, and the species was not again observed until June, 1898, in the northern part of Cayuga County, New York. Here, under the guidance of an observing local ornithologist, Mr. E. G. Tabor, an encounter was had with a Least Bittern which made a unique page in my experience as a bird student.

It was on the border of Otter Lake, where the Least Bitterns nest in small numbers in low bushes, or a mass of drift, or more often in the fringe of cat-tails. The trail of a boat through the reeds and empty nests, which before had held from three to five eggs, marked the ill-directed work of the boy oölogists whose misspent zeal has resulted in such a vast accumulation of eggshells and such an absence of information about the birds that laid them. A visit to a more distant part of the lake, where even thus early in the year the cat-tails were five feet above water of over half that depth, saved the day, as far as Least Bitterns were concerned. Paddling close to the reeds, a practiced eye could distinguish the site of a Bittern's nest, when the nest itself was invisible, by the bowed tips of the reeds which the bird invariably bends over it.[31] The object of this habit is perhaps to aid in concealing the eggs from an enemy passing overhead—a Crow, for example—an attack by boat evidently not being taken into consideration.

Certainly our appearance was in the nature of a surprise to a pair of birds who had just completed their platformlike nest and were appar-

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32. Least Bittern's nest; reeds parted to show eggs.

ently discussing future steps in their domestic affairs.

As we approached, the female, who even before the eggs are laid seems to have the home love more strongly developed than the male, bravely stuck to

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her post, while the male marched off through the reeds in the manner which has been described as so remarkable. When he paused, with either foot grasping reeds several inches apart or clung to a single stalk with both feet, he resembled a gigantic, tailless Marsh Wren.

33. Least Bittern on nest mimicking its surroundings.

The actions of the female were interesting in the extreme. Her first move was an attempt at concealment through protective mimicry—a rare device among birds. Stretching her neck to the utmost, she pointed her bill to the zenith, the brownish marks on the feathers of the throat became lines which, separated by the white spaces between them, might easily have passed for dried reeds, and the bird's statuelike pose, when almost within reach, evinced her belief in her own invisibility.[33] [34]

The pose recalled Hudson's experience with a

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wounded Least Bittern (*Ardetta involucris*, a near relative of our bird) in the marshes of La Plata, where a bird at his feet, in the same position as the one before me, was discovered only after careful search, and which, to the naturalist's amazement, slowly revolved as he walked around it, with the presumable object of keeping its protectively colored breast turned toward him.

34. Least Bittern on nest mimicking its surroundings.

My bird, however, was among fresh reeds, and while one can not doubt the effectiveness of its attitude and color, when seen among dead reeds or grasses, neither were of value among its green surroundings.

With the light on the wrong side and the reeds swaying violently in the wind, we essayed to picture the bird, and the best of several attempts made under these adverse conditions are here given.

Covering my hand with my cap I held it toward her, when, convinced that her little trick had failed, she adopted new tactics, and struck at me with force and rapidity, which made me thankful that my hand

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was protected. Her bright yellow eyes glared with the intensity of a snake's, and her reptilelike appearance was increased by the length and slenderness of her head and neck. Her courage was admirable; she not only displayed no fear, but was actually aggressive, and with a hissing *hah* struck viciously at my hand each time it was placed near the nest. As I quickly retreated on each occasion, and at length made no further move toward her, she decided to withdraw, perhaps to join her cautious mate, who from the reeds had been uttering a warning *tut-tut-tut* at intervals. Very slowly and watchfully she left the nest, and when she had advanced a few feet through the reeds I again ventured to touch her platform home, putting my hand, however, under it; but the motion instantly attracted her attention, and, darting back to her post, she was on guard in a moment. Then I left her, retiring from the field fairly vanquished in my first hand-to-bill encounter with a wild bird. I hope she laid a full complement of five eggs and from them reared five birds worthy representatives of their mother.

A desire to renew my acquaintance with—or perhaps I should say advances toward—this unbirdlike feathered biped, and to meet it under conditions more favorable for the camera hunter, brought me the following year (June 17, 1899), to the Montezuma marshes at the head of Cayuga Lake. Here are endless forests of cat-tails in which dwell not only Bitterns, Long-billed Marsh Wrens, and Red-winged Blackbirds, but also numbers of Pied-billed Grebes and Florida Gallinules.

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There is a mystery about a marsh akin to that which impresses one in a primeval forest. The possibilities of both seem limitless. One hears so much and sees so little. Birds calling from a distance of only a few yards may remain long unidentified. A rustling in the reeds arouses vague expectations.

The notes of marsh-inhabiting birds are in keeping with the character of their haunts. They are distinctly wild and strange, and often thrilling. The Rails, for example, all have singular, loud, startling calls. The American Bittern is a famous marsh songster, but although several of his common names are based on his calls, it is only recently that he has actually been seen uttering them. The Gallinule resembles the hen in the character, volume, and variety of its notes, and to it and not the Clapper Rail should be given the name "Marsh Hen." Indeed, its European relative, from which it can scarcely be distinguished, is known as the Moor Hen or Water Hen.

But of all this marsh music none to my ear is more singular than the call of the Pied-billed Grebe. It is mentioned in few books, and has won the bird no such fame as the Loon's maniacal laughter has brought him, though as a vocalist the Grebe fairly rivals his large cousin. Like most bird calls it is indescribable, but perhaps sufficient idea of its character may be given to lead to its identification when heard. It is very loud and sonorous, with a cuckoolike quality, and may be written *cow-cow-cow-cow-cow-cow-cow-cow-cow-uh, cow-uh, cow-uh, cow-uh.* These notes vary in number, and are sometimes followed by prolonged wailing *cows* or *ohs*

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almost human in their expressiveness of pain, fear, and anguish.

This is the love song of the male, and when he has won a mate she joins him in singing, uttering, as he calls, a rapid *cuk-cuk-cuk,* followed by a slower *ugh, ugh, ugh, ugh.*

The Gallinules were cackling in the reeds, where a nest with three hatching eggs was found, but not a

35. Young Red-winged Blackbirds.

bird was seen. Red-winged Blackbirds were chattering with excitement as they guided the first wing strokes of their young, who perched on the reeds begged eloquently for food rather than for lessons in flying.[35]

In a small island of cat-tails a pair of Grebes was calling, and after the most careful stalking my companion saw the female respond to the voice of her mate.

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It was in this island—if a patch of cat-tails growing in three feet of water can be called an island—that we found the first two of numerous Least Bitterns' nests, and here our camera studies were made. These nests were typical in form and site; one contained five and the other four[32] eggs, from which the birds had apparently departed as we pushed our boat toward them.

Less than twenty minutes later we again passed these nests and found, to our surprise, that in one all four, and in the other two eggs had been punctured, as if by an awl. Here was a mystery which my companion, who was examining the second nest while I was studying the first, quickly solved by seeing a Long-billed Marsh Wren actually make an attack on the remaining three eggs, and a little later a bird of the same species—perhaps the same individual, since the Bitterns' nests were not more than twenty yards apart—visited the first nest to complete its work on the five already ruined eggs.

Our attempt to photograph the energetic little marauder failed, nor did we succeed in learning the real cause of its remarkable destructiveness. However, the fact that in one nest alone it drove its needlelike bill into all five eggs without pausing to feast on their contents, would imply that it was not prompted by hunger, and, much against our will, we were forced to attribute the bird's actions to pure viciousness; though, it is true, there may have been another side to the story, in which the Bittern was the culprit.

The owners of the four eggs did not return while

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36. Least Bittern eating her eggs.

we were present, and the following day we found their nest empty—a mute protest against fate.

The female of the second nest discovered, in which only two of the five eggs had been injured, proved to be a bird of character.

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While we waited in our boats at a distance of fifteen feet, and with cameras erected on tripods

37. Least Bittern on nest.

at a third of the distance, she came walking through the reeds uttering occasionally an explosive *quoh!*

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After circling about us several times she climbed to her nest, and at once proceeded to investigate the condition of its contents. Soon she gave evidence of the possession of both a philosophic and economic disposition, not to mention other housewifely qualities, notably cleanliness. Philosophy she exhibited by making the best of things as she found them; economy by carefully eating[36] the two broken eggs, which a more thoughtless bird would have deserted or quickly discarded; and cleanliness by carefully dropping over the edge of the nest the shells remaining from her peculiar feast, and following them by bits of nest lining which had been soiled by portions of the egg. This task accomplished to her satisfaction, she gave further evidence of the possession of a well-ordered mind by descending to the water, washing her bill, drinking, and then returning to her remaining three eggs, on which she settled herself[37] as complacently as though she had met with no loss, and there we left her in well-deserved privacy.

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TWO HERONS

N this age of death and destruction to all living creatures, which, because of their size or edible qualities, the so-called sportsman is proud to exhibit as evidence of his skill afield, it is remarkable that there should exist within twenty odd miles of New York's City Hall a colony of Herons which would do credit to the most remote swamp of Florida.

Three factors have combined to render this rookery possible: first, its isolation; second, the habits of its occupants; and third, the protection which is afforded it by the owner of the land on which it is situated. Of these, the first is by far the most important, and I may be pardoned, therefore, if I do not betray the birds' secret; for, much as I desire to encourage American industries, I must on this occasion withhold information of undoubted value to the feather trade.

The birds' habits contribute toward their preservation, because they are largely nocturnal, "Night" being the specific name applied by the text-books to this particular kind of Heron; but to those who know him in nature, he is generally spoken of as "Quawk," this being an excellent rendering of his common call.

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The Night Heron or Quawk belongs among the birds for whom the setting sun marks the beginning of a new day—a fact which protects him from man and permits his existence in numbers where others of his family are rarely seen. Doubtless many of the residents of Heronville know their feathered neighbors only as a voice from the night, which comes to them when the birds, in passing over, utter their loud and startling call.

Finally, to the protecting influences of a love for seclusion and darkness must be added the unusual position assumed by the proprietor of the land, who will not permit any one to kill the birds, and, stranger still, does not kill them himself!

Thus it happens that any day in May or June, the months during which the Herons are at home, one may leave the crowded streets of New York and within an hour or so enter an equally crowded but quite different kind of town.

If after leaving the train you secure the same guide it was my good fortune to have, your way will lead over shaded roads, pleasant fields, and quiet woodland paths, and, if the sun is well up in the trees, you may enter the outskirts of the rookery and be wholly unaware, unless you approach from the leeward, that between two and three thousand Herons are within a few hundred yards of you.

One may gain a far better idea of Heron life, however, by visiting the rookery while the foliage is still glistening with dew. Then, from a distance, a chorus of croaks may be heard from the young birds as they receive what, in effect, is their supper. Old birds are still returning from fishing trips, and

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the froglike monotone of the young is broken by the sudden *quawks* of their parents.

The rookery is in a low part of the woods which evidently is flooded early in the year, a fact which may have influenced the Herons in their selection of the locality as a nesting site. At the time of our visit the swamp maples, in which the nests are placed, were densely undergrown with ferns, and as we approached the whitened vegetation, which clearly marked the limits of the rookery, a number of Herons with squawks of alarm left the vicinity of their nests, and soon the rookery was in an uproar. The common *quawk* note was often heard, but many of the calls were distinctly galline in character and conveyed the impression that we had invaded a henroost.

The trees in which the nests were placed are very tall and slender, mere poles some of them, with a single nest where the branches fork; while those more heavily limbed had four, five,[38] and even six of the platforms of sticks, which with Herons serve as nests, but in only a single instance was one nest placed directly below another. A conservative count yielded a total of five hundred and twenty-five nests, all within a circle about one hundred yards in diameter, nearly every suitable tree holding one or more, the lowest being about thirty feet from the ground, the highest at least eighty feet above it.

While the limy deposits and partially digested fish dropped by the birds seemed not to affect the growth of the lower vegetation, it had a marked influence on certain of the swamp maples, the development of the trees which held a number of nests

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being so retarded that, although it was June 13th, they were as yet only in blossom.[38] The comparative absence of foliage permitted one to have a far better view of what was going on above than if the trees had been thickly leaved, and on entering

38. Five Herons' nests in swamp maple, at an average height of seventy feet. The upper right-hand nest with young shown in Nos. 41 and 42.

the rookery our attention was at once attracted by the nearly grown Herons, who, old enough to leave the nest, had climbed out on the adjoining limbs. There, silhouetted against the sky, they crouched in family groups of two, three, and four.[39]

Other broods, inhabitants of more thickly leaved

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trees, made known their presence above by disgorging a half-digested eel, which dropped with a thud at our feet and occasionally nearer, suggesting the advisability of carrying an umbrella. The vegetation beneath the well-populated trees was as white

39. A view in the Heron rookery, looking upward from the ground to nests and young, about eighty feet above.

as though it had been liberally daubed with whitewash, and the ground was strewn with blue-green eggshells neatly broken in two across the middle; fish, principally eels, in various stages of digestion

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and decay; and the bodies of young birds who had met with an untimely death by falling from above. It was not altogether a savory place!

Seating ourselves at the base of an unoccupied tree, we had not long to wait before the normal life of the rookery was resumed. The young, who while we were observed had been silent, now began to utter a singular, froglike *kik-kik-kik* in chorus, and

40. Black-crowned Night Herons feeding. Telephoto, × 2 at a distance of about one hundred and fifty feet.

the old birds one by one returned. When food was brought an increased outcry was heard from the expectant youngsters about to be fed. At intervals a resounding *thump* announced the fall of some too eager bird, but, in the cases which we investigated, the Heron, if fairly well grown, seemed to be little the worse for his tumble of from fifty to seventy feet,

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and with lowered head ran through the undergrowth with surprising quickness. With those which were younger, however, the mortality had evidently been great, and, seeing the dozens of dead birds on the ground beneath the nest trees from which they had

41. Young Night Herons in nest. Same as No. 42.

fallen, one questioned whether this habit of nesting high in trees had not, for protective reasons, been recently acquired by a species the young of which would seem much more at home nearer the ground.

It was with a delightful sense of companionship with the birds that I observed them going and coming, feeding their young, or resting after the night's

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labors, wholly undisturbed by my presence. Almost I seemed to be a guest of the rookery, and I longed for power to interpret the notes and actions of the birds so abundant about me.

So I should like to have passed the day with them, becoming for the time being a Heron myself;

42. Young Night Herons leaving nest. Nesting tree shown in No. 38.

but the desire to picture the birds was stronger than the wish to be a Heron, and the situation was considered from the standpoint of the bird photographer.

The rookery proved to be a difficult subject. No single view would convey an adequate idea of its appearance, and I therefore selected representative tree tops and photographed their nests and young birds. A visit to a neighboring pond resulted in

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securing, with the aid of a telephoto, a picture[40] of two adult birds feeding well out of gunshot, and with the assistance of climbers I reached the upper branches of a tree some seventy feet in height containing five nests whose contents ranged from eggs to nearly grown young. With the ball-and-socket clamp the camera was fastened to favoring limbs, and after three hours' work several satisfactory pictures of young in the nest and on the adjoining branches were secured.[41-43] Although well able to defend themselves, the young assumed no such threatening attitudes as the American Bittern strikes when alarmed, from which perhaps we may argue that they are happily ignorant of the dangers which beset their ground-nesting relative.

43. Young Night Herons on branches near nest, seventy feet from the ground.

As the sun crept upward and the last fishers returned, the calls of both old and young birds were heard less and less often, and by ten o'clock night had fallen on the rookery and the birds were all resting quietly. Four o'clock in the afternoon was evidently early morning, and at this hour the birds

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first began to leave the rookery for their fishing grounds. Some went toward the north, others to the south, east or west; each bird no doubt having clearly in mind some favorite shore, perhaps a dozen miles away, where he before had had good luck a-fishing; and of all the varied phases of rookery life the thought of this regular nightly expedition of hundreds of winged fishers, is to me the most attractive.

Our largest Heron as well as our largest bird is the Great Blue. "Crane" he is popularly called; but, aside from other differences, the bird's habit of folding its neck back on its shoulders, when on the wing, will distinguish it from true Cranes, who fly with neck extended to the utmost.

The Great Blue Heron is not edible, but its size makes it a desirable prize to most gunners and it is considered an especially fit mark for a rifle. The temptation is strong to condemn as an outlaw the man who kills one of these noble birds for what he terms sport, or perhaps for the purpose of what he would call having it "set up." He, however, is acting according to his light, which is quite as bright as that which shines for most of his neighbors. The Heron is exceedingly wild, and its capture is eloquent evidence of the hunter's prowess, while his desire to have its stuffed skin adorn his home is, from his point of view, positively commendable. That the bird is infinitely more valuable alive than dead, that its presence adds an element to the landscape more pleasing to some than could be imparted by any work of man, and that in depriving others

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of the privilege of observing its singularly stately grace of pose and motion he is selfish beyond expression, does not even vaguely occur to this so-called "sportsman," who belongs in the class to whom a majestic cliff is a quarry, a noble tree, lumber. Until he has been educated to properly value the beauties of Nature, or at least realize the rights of others in them, he must be restrained by law, to the force of which even he is not blind.

Only the Great Blue Heron's extreme wariness and habit of frequenting shores and marshes where it can command an extended view of its surroundings has preserved it from extinction; but when nesting it is compelled to visit woodlands where its human enemies have better opportunities to approach it, and its only chance for safety during the breeding season is to select a retreat remote from the home of man. For this reason Great Blue Heron rookeries are exceedingly uncommon in more settled parts of the bird's range, and north of Florida I have seen their nests in only one locality.

It was the week after my visit to the Night Herons that, in northern Cayuga County, New York, I was led by a local ornithologist through one of the heaviest pieces of timber I have ever seen north of a primeval tropical forest, in search of a Great Blue Heron rookery which he knew to exist, and only my confidence in his woodsmanship gave me courage to follow him over fallen trees and through the season's dense undergrowth, from which our passage raised such a host of mosquitoes that every step was a battle. If the vicious little insects had lived only to protect the Herons, they could not

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have disputed our progress more valiantly, and on reaching the birds' stronghold, where the comparative absence of undergrowth deprived our winged foes of shelter, I congratulated myself on what, for the moment, seemed to be no insignificant feat.

The eleven nests which my guide had seen on a previous occasion were found occupying their former positions, at least one hundred feet from the ground in dead trees, one of which held five of the eleven. During the many years which the birds have nested in the place their number has not varied, and one wonders what becomes of the from thirty to forty young who doubtless each year leave the parental trees. No other Herons of this species are known to nest in the vicinity, and it is not probable that the progeny of each year would seek a nesting site in some far distant rookery; consequently, as an alternative explanation, we can only suppose that the yearly product of the rookery balances its losses by death.

The young birds were now nearly half grown, but, unlike the Night Herons, they did not venture outside their nests, from which they uttered harsh croaks in evident supplication to their parents for food. The sight of the trees in which the nests were placed effectually controlled whatever ambitions I had entertained toward camera studies at short range, and I contented myself by making telephotos from the ground, in one of which an adult bird and two nests, each with a young bird appearing above its edge, may be seen.[44]

Time was lacking in which to observe these birds, and the value of my visit to their retreat is not to

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be expressed in words. The wildness of their home seemed in perfect accord with their nature, and their

44. Looking upward from ground to nests and young and adult bird of Great Blue Heron at a height of over one hundred feet. Telephoto.

apparent safety from intrusion brought a sense of satisfaction which colors my memory of the whole experience.

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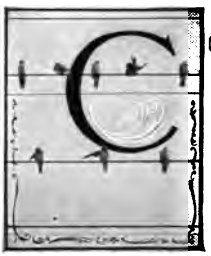
WHERE SWALLOWS ROOST



ONTRIBUTING little to the material wealth of the nation, the Hackensack marshes of northern New Jersey are usually regarded as "waste land." By the farmer they are termed "salt medders," and their waving grasses are of value to him only as "bedding" for cattle. In winter the muskrat hunter reaps a harvest of pelts there. The down of the "cat-tails" is gathered for cushion stuffing, and the bladed leaves for chair bottoms. To the gunner they are the resort of Ducks, Snipe, Rail, and Reedbirds, which each year visit them in decreasing numbers; while to the thousands who daily pass them on the encircling railroads they are barren and uninteresting. But if beauty is a sufficient cause for being, then these marshes may claim a right to existence.

In preglacial times this region was probably forested, but now the forest is buried beneath the drift of the glacier which deposited fragments of Palisade and Orange Mountain trap rock on Staten Island. During the depression of the land which occurred as the ice gradually receded, the waters of the sea doubtless passed up here and the meadow was a larger "Newark Bay." Then commenced their slow

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45. Hackensack marshes in August.

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filling up by the silt brought down by the Hackensack River. The river has preserved a right of way, but the bay has given place to a sea of reeds and grasses.

On a bright August morning I mount a spur of trap rock which reaches out from the western base of the Palisades, and from this elevation have an uninterrupted view over the meadows. The cool, invigorating air foretells the approach of autumn; it is brilliantly clear. The Orange hills stand out with the distinctness of Western mountains. The sun is at my back, and the light shows the meadows to the best advantage. At this distance I get the effect of only the masses of color; tracts of yellowish green meadow grass tinged with copper, and in places thickly sprinkled with the white flowers of the water hemlock and water parsnip; streaks of light green wild rice, and sharply defined areas of dark green cat-tail flags. The grass grows on the drier land, the wild rice in the small sloughs and creeks which are bordered by the flags. In the spring the wind blows the pollen from the cat-tail blossoms, and a shifting greenish vapor floats over the marsh; in the autumn a heavy westerly wind raises the seed-bearing down high in the air, carries it over the Palisades, across the Hudson, and it descends like a fall of fleecy snow on wondering New York.

The marsh is a vast arena inclosed by the Palisades and Passaic hills; it is a great plain, with blue stretches of the winding river appearing here and there, and the haystacks are the huts of aborigines. I half close my eyes, and it is a copper-yellow sea.

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The grasses roll in undulating waves, capped by a white crest of parsnip and hemlock blossoms; the dark irregular patches of flags are the shadows of clouds, the light streaks of wild rice are shoals, a hovering Marsh Hawk is a Gull. A stately white-winged schooner[45] comes up the river; her hull is hidden by the meadow grasses; she is sailing through the sea of my fancy.

This is an impressionist's view of the meadows. Now let us leave our rocky lookout and examine them more in detail. The meadow we are leaving is a meadow of all summer; the one we are approaching is a meadow clad in all the glory of its August flowers. One might think Nature was holding a flower show here, so gorgeous is the display. The railway track at the edge of the marsh is apparently an endless aisle bordered by a rich exhibit of flowers. Clusters of thoroughwort and purple loose-strife grow so abundantly they give color to the foreground, through which wild sunflowers make streaks of gold. There are solid beds of purple asters on the drier land, and delicate snow-white saggitarias in the sloughs. Jewel flowers sparkle through the flags, and convolvulus hangs from the reeds, its own foliage scarce showing, or, growing with the fragrant climbing hempweed, it forms banks of dense vegetation. The scarlet lobelia darts upward like a tongue of flame, startling in its intense brilliancy. There are burnet, vervain, gerardia, and running groundnut. But it is the marsh[46] mallow which, more than any other flower, gives beauty to the meadow. It grows here with wasteful luxuriance, and the dark masses of flags serve as a frame for

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this floral picture. Out in the marsh it grows in equal profusion; the meadow is hung with small pink lanterns, as if for a *fête*. A single flower of the marsh mallow commands the attention of the most unobservant, and when growing in abundance it excites enthusiastic admiration.

46. Marsh mallows.

Nor is the animal life of the marsh less interesting than its flora. Meadow mice nest beneath the haycocks. Were it not for the minks and Hawks which prey on them, they might become a scourge throughout the surrounding country. Muskrats are

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living in peaceful security in their snug summer homes, hollowed from the banks of the streams. They are the true villagers here, and pass the winter in icy huts, like Eskimos. Out in the grasses Short-eared Owls are hiding. Their day begins when the sun disappears behind the Orange hills; then one may hear the "quawk" of the Night Heron. Red-winged Blackbirds nest here, and in the autumn they gather in great flocks and feed on the wild rice.

47. Wild rice.

Long-billed Marsh Wrens — small, nervous, excitable bits of feathered life—are abundant in the flags, and to them they attach their large woven nests. Except for a harsh, scolding note they are silent now, but earlier in the year the marsh is musical with their rippling songs. The fervor of the love season overcomes their fondness for the dark recesses of the flags, and, singing, they rise into the air as if driven

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upward by the mine of melody which explodes within them.

Swamp Sparrows are common, and their clear trill is one of the few August songs. Bobolinks, traveling in disguise and under the assumed name of "Reedbird," pause here to feed on the ripening wild rice.[47] Some of them have not yet completed their change of costume and appear in a spotted suit of black and yellow. Occasionally one hears a suppressed burst of the "mad music" of June, but their common note is a metallic *chink*. At night this note is heard from high in the air, as the birds continue their journey to the cultivated rice fields of South Carolina and Georgia, there to remain until September or October, when they leave for their winter home south of the Amazon.

The Sora Rails, beloved of sportsmen and epicures, are also attracted to the marshes by the wild rice. On their arrival in early August they are indeed "as thin as a rail," but an abundance of food soon rounds their bodies into comparative plumpness. The 1st of September is a black day in their calendar. Then they are outlawed, a price is set on their bodies, and at high tide each day during this sad month one sees numerous puffs of smoke arise from the tall grasses and dull reports come booming over the marsh with fateful frequency.

But the characteristic birds of the marshes at this season are Swallows. They outnumber many times all the rest of the marsh birds together—in fact, are present in such myriads that their gatherings are one of the most interesting and impressive phenomena of the bird life of this region.

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Five species are represented. Named in the order of their abundance they are the Tree, Bank, Barn, Eave, and Rough-winged Swallows. The last are comparatively rare, while the Tree Swallows are so in excess of all the species named that the following remarks relate largely to them alone.

Although Tree or White-breasted Swallows nest locally throughout North America, from the tableland of Mexico to Labrador and Alaska, there are but few instances of their breeding in the lower Hudson River valley, where they appear only as migrants or transient visitants. They arrive from the south early in April, and their northward migration is not concluded until about June 1st. During June they are rarely seen, but between the 1st and the 5th of July they begin their journey to their winter homes—a movement which inaugurates the fall migration.

This stage of their journey takes them only to certain marshes, which become stations on their line of travel where countless numbers of their kind, impelled by the flocking impulse, gather to roost in the reeds. Their numbers increase steadily through July and August, the maximum of abundance being reached about September 1st; then they gradually become less numerous, and by October 10th comparatively few remain, though if the weather be favorable, they may be observed daily until late in the month.

Throughout this period—from July to October—the marsh is used only as a dormitory, the reeds evidently offering suitable perches to these weak-footed birds, who in the morning radiate throughout the sur-

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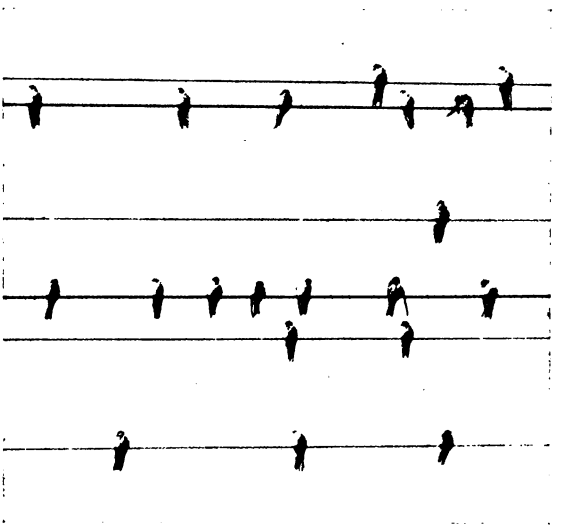
rounding country and in the evening return to the marsh to sleep. In the evening they fly low, and the altitude and time of their flight make them conspicuous. In the morning they fly high, as though bound to some distant feeding ground, and at so early an hour that they usually escape observation. The evening flight, therefore, is generally considered



48. "Bird notes"— Tree Swallows.

as truly migratory, when, in fact, the same birds doubtless pass over a given locality night after night, perhaps for weeks, in returning to their roosts in the marshes.

These evening flights begin about two hours and a half before sunset, when the birds, after resting during the late forenoon and early afternoon, usually on some telegraph wire,[48] begin to wheel and

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circle over the fields in pursuit of their evening meal, when one might imagine they were resident birds, but observation will show that the general trend of their movement is toward the roost.

This continues for an hour to an hour and a half, a cloudy evening hastening their actions, when their flight becomes more direct. Few birds pause to feed, but hurry on to the roosting places, and as the light fades the last birds rush through the gloom with arrowy speed and directness. The birds pass in straggling flocks, and periods of abundance are succeeded by intervals of scarcity, as though the individuals which had been associated during the day were journeying home together.

Thus the Swallow's evening flight may be observed throughout the region surrounding the marshes; even in New York city they may be seen feeding above the houses, and after sunset flocks of swift-flying birds are often confused by the telegraph wires, which, however, their dexterity of wing permits them to pass without serious harm.

In the marshes the first birds are seen about two hours before sunset. Many follow the course of the river, and if one be at its border splash after splash is heard as the birds dip lightly into the water, followed by soft fluffs as arising from the stream they shake their plumage. Soon the air is filled with Swallows, all streaming toward the roost with increasing swiftness.

Many birds, however, as though waiting for some tardy comrades, rest by the way, perching on telegraph wires should they cross the marsh, or when these are wanting, on the tips of the reeds. They

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invariably face the wind, and when it is from the west the last rays of the sun striking their white breasts make them appear like snowy flowers crowning the reeds. Suddenly, with a rush, they whirl onward to the roost.

Thus far the exact location of this roost has defied my search. I have, however, roughly defined the bounds of that section of the marsh in which it is placed by observation stands at which the Swallows flew north and south respectively, and somewhere between the two I still hope to discover the Swallows' sleeping haunts.

The following description of their departure from the marshes in the morning is abstracted from my journal, under date of August 15, 1886: "A cool, clear morning, with a light northwesterly wind. I reached the marshes shortly before five o'clock, when they appeared to be deserted, not a Swallow being in sight. At two minutes of five the first birds were observed, then flock after flock they came until at five the air was filled with hurrying forms, flying at varying altitudes toward the north.

"Suddenly, from the meadows near me there arose a vast cloud of Swallows, doubtless birds which had come from farther south in the marsh before my arrival. Steadily they mounted upward, until having attained a height where with a strong glass they appeared faint dots against the sky, they slowly winged their way northward.

"All the time the meadows were alive with birds feeding in every direction; gradually they passed to the north, when another huge flock arose from the

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marsh, and after gaining an immense height disappeared, this time toward the east.

"As the sun rose over the Palisades few birds were on the wing, but great flocks were perched in the reeds on the banks of the creek, and as in my canoe I drifted slowly up to them, they seemed unmindful of my presence, when, as though at a signal, they arose as one bird, and after hovering lightly overhead returned to the reeds.

49. Tree Swallows in tree.

"The tide was low, and along the shore several Sora Rail were feeding, and, as carried by the tide I floated noiselessly by, they paused in their search for food, and with tails upraised regarded me with evident astonishment. A mink approached the shores of a small inflowing stream, hesitated, then plunged in, crossed, and disappeared in the tall grasses on the opposite side. The air was vocal with the calls of Red-winged Blackbirds, the *chink* of Bobolinks, and the rattle of Swamp Sparrows.

"On a reed-grown point below was another great army of Swallows. With surprising regularity a

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detachment left it every fifteen minutes; thus, birds left at 6, 6.15, 6.30, and 6.45, when the reeds were deserted. The departing birds did not arise alone, but the entire flock arose at once, then divided into two flocks, one of which flew northward while the other returned to the reeds. Many of the departing birds alighted on the reeds farther up the creek; their numbers constantly received additions from the ranks of passing birds, and thus new flocks were formed.

"At eight o'clock the last Swallows had left the reeds in my vicinity, but birds were constantly passing toward the north, and this straggling flight continued until nine o'clock, when again the marshes appeared deserted."

Subsequent observations have been made largely from a road crossing the marsh, the telegraph and electric-light wires which border it being the resting place of vast numbers of Swallows, both at night and in the morning. Particularly do they throng the wires near the creek, which flows north and south through the marsh, and which, it is interesting to observe, forms a natural highway for the Swallows as they go to and from their roosts.

On the sides of this road are several small maple trees, to which the Swallows often resort in such numbers that their foliage trembles as though in a strong breeze, it not being the birds' object to perch in the trees, but to flutter among the dew-laden leaves, and apparently bathe in the moisture they contain, while between the baths they rest on the smaller terminal twigs, when they are very difficult

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50. Tree Swallows on wire and nest hunting about pile.

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to observe.[49] This habit does not appear to have been previously recorded, and I am by no means certain that the explanation offered is the true one.

Frequently one or more flocks, varying in size from eight or ten to several hundred birds, may be seen in the road, where I at first supposed they were "dusting," but soon noticed that most of the birds after alighting in the road were motionless. They did not move about as though searching for food, but occasionally the actions of a pair enabled one apparently to determine the sex of each individual, and more often a bird would pick up a bit of dried grass and fly up into the air with it. Sometimes it was carried fifty yards or more and then dropped; at others, the birds would carry it to the telegraph wires above, and drop it after perching a moment. Without exception, all the birds seen to alight in the road were in the dull, immature plumage of birds of the year, and in their actions, as Mr. William Brewster has remarked (The Auk, 1898, p. 194), they evidently gave a premature exhibition of the procreative and nest-building instincts.[51]

Additional evidence of the possession of inherited knowledge was apparently given by many Tree Swallows, who were frequently seen hovering about a pile standing in the creek.[50] At first it was supposed that these birds were feeding on insects which had alighted on the pile; but the number of birds—often a dozen or more—seen fluttering about it, and the persistency with which they remained there, forced the conclusion that in a wholly unreasoning way they were looking for a nesting site.

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Swallows are not known to migrate by night, and, so far as I am aware, no single Swallow has ever been found among the thousands of night-flying birds which have perished by striking light-houses. The Swallows, therefore, when migrating

51. Immature Tree Swallows gathering nesting material.

probably leave the marsh during the day, but in what manner who can say ?

Several times when crossing the marshes on the cars I have observed gatherings of Swallows which made the immense flocks observed daily in August

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and September seem little more than a family of birds. They appeared in the distance like a vast swarm of gnats; it was as though all the Swallows in the marsh had collected in one great storm of birds. The significance of this movement I have never had the fortune to determine, but it seems highly probable that it is connected with the inauguration of an actual migration toward the birds' winter quarters.

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TWO DAYS WITH THE TERNS

ERNS are useless for food, and can not therefore be classed as "game birds." So far as we know they are of no special economic value. Consequently, when one protests against their practical annihilation for millinery purposes, he is not infrequently answered: "Well, what good are they?" The question exposes so absolute a failure to appreciate the bird's exquisite beauty and unexcelled grace—such a discouraging materialism—that one realizes the hopelessness of replying.

I confess I find it impossible to describe satisfactorily just what the presence of Terns along our coast means to me. It is not alone their perfection of color, form, and movement which appeals to one, but also the sense of companionship they bring; and doubtless this feeling is emphasized by the impressive loneliness of the sea, which makes anything alive doubly welcome. And so the coming of a single one of these beautiful creatures changes the character of the bay or shore. With unfailing pleasure one watches its marvelously easy flight, its startling darts for its food of small fish, and when it disappears the scene loses a grateful element of life.

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A milliner's hunter or fisherman, however, might have made a very different reply to the unimaginative individual who asked the value of Terns. The former would have told him that they were worth about ten cents each for hat trimmings; the latter would have said that their eggs made excellent omelets; and each has done his best—the one to lay all Terns on the altar of Fashion, the other to see that none of their eggs escaped the frying pan.

In the meantime a number of bird lovers have taken up the battle for the Terns in their few remaining strongholds, and the brief history of Tern destruction and protection is full of suggestive incidents.

It was about twenty years ago that Terns first found favor in woman's eyes, and during the few succeeding years hundreds of thousands of these birds were killed on the Atlantic coast for milliners. Cobb's Island, on the coast of Virginia, is credited with having supplied forty thousand in a single season, and, as one of the killers recently confessed to me that he knew of fourteen hundred being killed in a day, the story is doubtless true. Their delicate white and pearl-gray feathers were, of course, badly blood-stained; but good and bad, the skins were washed and then thrown into a barrel of plaster, which was rolled up and down the beach until the moisture was absorbed from their plumage. A Long Island taxidermist used a patent churn for this purpose.

The destruction at other favorable points was proportionately great, and in two or three years one

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looked in vain for the Terns which had previously so enlivened our shores.

The protection afforded by an insular existence was now given a practical and striking illustration. The Terns which nested on the mainland or near-lying sand bars were soon extirpated, but on certain less accessible, uninhabited islets, they still survived.

Thus all that were left of countless numbers of these birds which once inhabited the shores of Long Island were to be found on the Great Gull Island, while Muskeget and Penikese, off the Massachusetts coast, contained the only large colonies of Terns from Long Island to Maine. The existence of the Gull Island colony being threatened by collectors, the influence of several bird lovers secured the appointment of the keeper of the lighthouse on the neighboring islet, Little Gull, as a special game warden to enforce the previously useless laws supposed to protect the Terns.

The result was both encouraging and instructive. In two years it is estimated that the colony increased from two thousand to four thousand, and it was hoped that it might prove a nucleus from which the adjoining shores would eventually be restocked with Terns. But the Government at Washington selected Great Gull Island as a desirable point for fortifications, and before even this suggestion of war the poor Terns disappeared. For one season the laborers employed by the Government feasted on Terns' eggs; then the gradual occupancy of the eighteen acres composing the islet forced the birds to seek homes elsewhere.

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Hence it follows that if one would see Terns in numbers on the middle Atlantic coast to-day, he must journey to two small islets off Massachusetts, which thus far have afforded them a refuge. Interesting it is to recall that on Martha's Vineyard, lying between the two, are found the only living representatives of the Heath Hen, or Eastern Prairie Hen, which was once locally abundant in certain parts of the Eastern and Middle States.

In 1889 I visited the Terns of Great Gull Island, and a desire to be again surrounded by these birds, and perhaps secure photographs of them and their way of living, brought me on July 16, 1899, to Wood's Holl, Massachusetts, *en route* to whichever Tern headquarters it might prove most convenient to reach.

Quite unexpectedly there proved to be a small colony of Common and Roseate Terns on three islets, known as the Weepeckets, standing in Buzzard's Bay, near the entrance to Wood's Holl. In all, there were probably between three and four hundred birds, of which by far the greater number appeared to be domiciled on the largest of the three islands. This contains from ten to twelve acres of sand, grown with beach grass, scrub sumach, bayberries, and a few stunted pines about two feet in height.

On this apparently uninviting bit of land I passed two delightful days alone with the Terns. The accompanying photographs tell far more of the birds than pen can well express, but they convey no suggestion of the pleasure I experienced in again finding myself among them.

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The birds were nesting on the upland, on the sloping grass bank, on the northwest side of the island, and on the rocky beach[52] at its base. In the two first-named locations most of the nests were lined with grasses, but occasionally they consisted of only

52. Nesting site, nest, and three eggs of Common Tern. A nearer view of nest with sitting bird is shown in Nos. 63 and 64.

a slight, bared depression in the earth; while the eggs along the beach were, as a rule, deposited on wisps or piles of driftweed. There were perhaps six or eight Roseate Terns, the others were apparently

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all Common Terns, but as I am unfamiliar with the very similar Arctic Tern, it is possible that this species may have been present.

A Tern colony is in some respects a unit. The alarm of one bird is shared by all, and before the boat's keel grated on the sandy beach of the largest Weepecket, the snowy-breasted birds, which in a group were resting there, had taken flight, and with their singular call told all the other Terns on the island of my invasion. At once the birds gathered and, hanging in a flock overhead, protested most vigorously against my intrusion with their purring, vibrant *te-a-r-r-r*. This cry never ceases so long as one remains near their home; it rings in the ears for days afterward, and one need only to recall it to form a clear mental picture of a sky full of hovering Terns. Occasionally this monotone was punctuated by a loud, reedy *cack* as a Roseate Tern dashed by, or as some half-distracted bird, whose nest was doubtless near, screaming, dived close to my head with a sudden, startling swish. It seemed almost as though the bird would pierce me with its sharply pointed bill; and if it could have managed to go through the rim of my hat without damage to either of us, I should have been very glad to have

53. Tern hovering above nest.

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sacrificed that article of apparel to such an exhibition of bravery.

As I advanced I began to discover nests. Some were on the upland, snugly placed in the grass or near a large stone,[54] and with pretty surroundings of yarrow, sumach, or bending grasses; others were on the little shelves of the steep westerly bank of the islet; and others still on bits of seaweed among the pebbles and rocks which here formed the beach.[55] No attempt was made to take advantage of the concealment offered by the groups of bowlders scattered along the beach, and beneath which the birds might have hidden effectively, it being presumably their object to select a site from which they could readily detect any cause for alarm. As a rule, their nests contained one or two eggs, only a single nest being seen with three.

54. Nest and eggs of Tern on upland.

Although by this time birds of the year should have been on the wing, few young of any age were seen—a condition which was doubtless explained by the fact that the birds, thus far, had been too much occupied furnishing the members of boating parties with souvenirs of their day's outing, to give attention to their own household affairs.

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However, the few young that were seen gave a most interesting exhibition of their instinctive appreciation of the value of both their protective colors and the power of their legs. As long as they

55. Tern's nest and eggs in drift *débris*.

believed themselves unobserved they trusted in the former; but the moment they became convinced that a further attempt at concealment was useless, they transferred their faith to their pedal extremities, on which they pattered off as far and as fast as their strength permitted. This observation was verified later on Penikese,[57] where young were numerous, and the habit was well shown by the young bird figured.[56] He was discovered squatting among the rocks, where he remained, practically at my feet, while I set up my tripod and deliberately made his picture—during which operation so inconspicuous was he that I invariably had to hunt for him each time I removed my eyes from the exact spot in which he was crouching. Wishing now to show him to better advantage, he was picked up and placed on a wisp of drift-

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weed. At once his manner changed. My touch had broken the spell; what could be felt could be seen, and, whereas before he had been as motionless as the pebbles about him,[57] his one object now was to get out of sight as speedily as possible. Consequently, time after time, the moment I took my hand from him he was off, and it was only by squeezing the bulb the moment he was released that I succeeded finally in securing his picture on the seaweed.

Young Terns, apparently, spend at least two days in the nest, during which time they are brooded

56. Young Tern hiding on rocky beach.

by the parents; then they wander about within a limited space seeking the shade of a stone or bit of driftwood, always of course under the parental care. At Penikese, young of the year were seen on

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the wing, and the series of pictures shown represents the stages of growth from the egg to the age at which the bird takes flight.

Both the nature of the bird's haunts and the manner in which the members of a colony spread an alarm make it practically impossible to surprise a

57. Young Tern hiding in the grass.

Tern upon its nest. But by lying prone upon the ground one attracts far less attention than when standing. The hovering flock of birds gradually disperses, and those which are incubating soon return to the vicinity of their nests, hanging over them and dropping nearer and nearer,[53] until at the end of fifteen or twenty minutes they swoop down beside them, raise their wings high over their backs, then fold them gently and settle upon their eggs.[58]

On a second visit to the island a bit of old sail was brought, which I drew over me when lying on the ground—a plan resulting in my practical disappearance, as far as the Terns were concerned.

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Obviously the only manner in which photographs of the Terns on their nests could be secured was to conceal one's camera near the nest and retire, with a tube or thread, to a distance of a hundred feet or more. A nest was therefore selected about halfway up the bank on the westerly side of the island, the camera staked to the ground with long iron pins, and completely covered with the dried seaweed abundant on the beach below. I then attached a

58. Tern alighting on nest. Same nest as Nos. 60–62.

black linen thread to the shutter and retired about one hundred feet to the top of the bank. Almost as soon as I lay down the tumult overhead ceased, the birds scattered, and the rasping *te-a-r-r-r* note of

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alarm was replaced by a variety of calls, showing these birds to be possessed of an unexpectedly extended vocabulary. One call was a chirp not unlike

59. Tern on hillside nest.

the White-throated Sparrow's, a second might be written *tue, tue, tue,* and was uttered when one bird was in pursuit of another.

The seaweed not only concealed the camera perfectly, but was so abundant near the bird's nest that the appearance of a fresh mound apparently did not even excite the bird's curiosity, and within twenty minutes it had returned to its eggs. It happened, however, that the nature of the site chosen induced the bird to face the water, and as the camera was above, and consequently behind it, the view presented did not show it to advantage, but after several unsuccessful trials the attempt to secure a more flattering view was abandoned.[59]

A bird was now chosen who was incubating two eggs placed in a depression in a little mound of seaweed on the beach. On this occasion the camera was

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placed on a driftwood box, weighted with stones, and completely covered with seaweed. These eggs were hatching, and the bird soon returned to them; but before it had come back, another bird in darting

60. Tern's nest and hatching eggs in seaweed.

by had flown into the thread, springing the shutter, and making the picture[60] of the nest and eggs here given quite as effectively as many a similarly inexperienced photographer could have done.

The day but one following—July 20th—these eggshells had disappeared, and the nest was occupied by two young birds with just enough strength to crawl toward the parent bird when it appeared with food.[61] And when their appetites were appeased the parent bird took her place on the nest and brooded them with the care of an anxious hen.[62]

A few yards from this new family were two young who could not have been over four days old, but who had left the nest for the shade of a piece of driftwood. Here they were fed by two birds—doubtless both parents—whom they seemed to recognize among the other Terns hovering above them. They

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were apparently fed on small fish, which the parent bird placed in their open mouths while standing just within reaching distance. None of the several pictures of these birds were wholly successful, but in

61. Tern about to feed young. Same nest as No. 60.

all of them the old birds seem to be much more graceful in form than the parent of the newly hatched young in the seaweed.

A less experienced Tern had placed its nest of a few bits of seaweed among the pebbles, almost within reach of the waves. This bird was singularly restless, turning its head from side to side so constantly that its picture was secured only by pulling the long thread the moment after the bird moved.[63, 64] Like all the birds photographed on the

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nest, it showed no alarm at the click of the shutter as the exposure was made. This surprised me not a little. The camera was usually about three feet from the bird, the exposure was necessarily rapid ($\frac{1}{25}$ second and stop 8), the snap of the old-style "Henry Clay," used on the first day, or even of the less loud Iris diaphragm, could be plainly heard at a distance of several yards, and its failure to startle these nervous, easily frightened birds makes one suspect that their hearing is deficient.

The nests of the Terns that chose the upland for a home were often picturesquely surrounded by stunted sumach or blooming yarrow, but the birds here were far less easy to photograph because of

62. Tern brooding young. Same nest as No. 60.

the difficulty of thoroughly concealing one's camera. The owner of an especially pleasing nesting site kept me beneath my bit of sail for somewhat over two hours, while she—if it was she—hung in the air just

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63. Tern on nest. Site shown in No. 52.

over her eggs, on which I momentarily expected to see her settle.[65]

In the meantime the tide had arisen and floated my boat, which was carried by the wind across to Naushon, and I might have passed the night with the Terns, had not the Fish Commissioner's launch taken me off in the afternoon.

64. Tern on nest. Site shown in No. 52.

It would not have been an unwelcome experience. There was an abundance of dry seaweed for a couch—a nest, I had almost said—and some cavern-like openings beneath the piles of great bowlders had a very snug and cozy look, which probably would have disappeared shortly after sunset.

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Two days later I went to Penikese, and my dominant thought on recalling the experience is an intense desire to repeat it. Penikese, or at least its northern part, is an island of Terns. On the rocky beach, from which the sides of the bank lead to the

65. Tern on upland nest.

rolling upland above, whichever way I looked was a Tern's nest with its two, or, rarely, three eggs. Less frequently young Terns were seen, varying in age from those just emerging from the shell to others almost ready to fly, while overhead was a

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countless multitude of hovering, darting Terns, whose voices united in one continuous, grating *te-a-r-r-r* made the air tremble. There was an occa-

66. Young Terns; first stage, about four days old.

sional vibrant cack from a Roseate, but not more than a dozen birds of this species were heard. Asked to estimate the number of birds present I should have said ten thousand, though I should not have been surprised to learn that there were twenty thousand. However, Mr. George H. Mackay, of Nantucket, who may be regarded as a Tern specialist, placed the number of Terns on Penikese, in 1896, at "six or seven thousand," and with the assistance of Mr. R. H. Howe, Jr., counted 1,416 nests containing 2,055 eggs (Auk, xiv, 1897, p. 283).

A small flock of sheep shared this part of the island with the Terns, and their presence accounted for the short grass which made the upland resemble a closely cut lawn, and permitted one readily to see

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the Tern's eggs when several yards distant. For the same reason the birds could be seen even more

67. Young Tern, about a week old.

68. Young Tern; third stage, second plumage appearing.

plainly, and my most pleasing memory of Penikese is the greensward dotted with the white forms of

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breeding birds, who had returned to their nests after I had partially concealed myself behind a bowlder.

In or near the nests many dead young birds were seen. The cause of their death was not evident, unless it may be attributed to the unguarded footsteps of the grazing sheep. If this be true, the parent birds seemed in no way to resent the sheep's carelessness, but accepted their presence without

69. Young Tern, fourth stage.

protest; one bird even exhibited a sign of good fellowship by perching on a sheep's back, and the length of time it remained there showed that it was by no means an unwelcome visitor.

My time on Penikese was too short to more than show what an admirable opportunity is here offered the ornithologist who desires to make a close study of the home life and social relations of Terns. The

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present owners of the island, the Messrs. Homer, of New Bedford, take a greatly to be commended interest in the welfare of their feathered tenants, and, through posters and the agency of their representative on the island, aim to afford the birds a much-needed protection.

What an enviable possession! What a privilege to be able to give a refuge to so large a propor-

70. Young Tern, stage before flight.

tion of the remaining survivors of these persecuted birds!

With no desire to underrate the services to the Commonwealth of these gentlemen, I still could wish the Terns more stable protectors. Not the State,

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whose record as a Tern protector does not invite our confidence, but a society of bird lovers—the Nuttall Club of Cambridge, or the Audubon Society of Massachusetts. Would it not be a fitting act for one of these organizations to ask from woman, the Tern's chief enemy, contributions to a fund for the purchase of an asylum for her victims. Can no one so plead the Terns' cause that many a feather-bedecked woman will be glad to send her conscience money to aid in securing their protection ?

But in addition to being a home of the birds, Penikese has other claims upon Nature lovers. Here Agassiz, through the medium of his summer school, brought his pupils into direct contact with Nature, and the scene of his labors is fraught with associations to every one familiar with the inspiring history of his life. Let us keep this island sacred to his memory and the Terns.

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THE BIRD ROCKS OF THE GULF OF ST. LAWRENCE

PERCÉ AND BONAVENTURE

HE naturalist realizes with the utmost sadness that the encroachments of civilization are rapidly changing the conditions of animal life on this small sphere of ours, and that soon he may find Nature primeval only in its more remote or inaccessible parts.

Forest life vanishes with the demand for timber, which sends the axeman in advance of the agriculturist. The tillable plains, prairies, and bottom lands are transformed by the plow. The sandy beaches suffer with an eruption of summer hotels and cottages, and within the confines of civilization only such useless portions of the earth's surface as the arid deserts and barren mountain tops, marshy wastes and rocky or far-distant islets, have been unaltered by man.

It is especially to the preserving influences of island life that we owe the continued survival of many animals which have greatly decreased or become exterminated on the mainland, as has been remarked of the Terns and Heath Hen—two illus-

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trations among hundreds that might be given. Certain animals, therefore, are not only more abundant on islands, but, if their home be not shared by man, they exhibit a tameness surprising to one who has known only the timid, man-fearing creatures of the mainland.

On several uninhabited West Indian islets the sailors of Columbus killed Pigeons and other birds with sticks, or caught them in their hands. Darwin writes of the "extreme tameness" of the birds of the Galapagos, and tells of pushing a Hawk off its perch with the muzzle of his gun. Moseley, on Inaccessible and Kerguelen Islands, had similar experiences.

The Albatrosses of the Laysan Islands show far less fear of man than do barnyard fowls—in short, if it were necessary, hundreds of instances might be cited to show that distrust of man is an acquired and not a natural trait of animals.

Having these facts in mind, therefore, I bethought me of some island or islands which were neither at the antipodes nor either pole, and where birds were not only abundant, but in such happy ignorance of man that no difficulty would be experienced in securing their photographs. These would not only have a present interest and value, but would also form permanent records of conditions already threatened by the destructive tendencies of the age.

After carefully considering all the more easily reached islets of the Atlantic and Pacific coasts, my choice fell on certain of the bird rocks of the Gulf of St. Lawrence. The name bird rock is used in both a general and a special sense. In the former it

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may be applied to many of the rocky islets of the gulf, in the latter it relates exclusively to *the* Bird Rocks at the northeastern end of the Magdalen group.

Percé Rock, Bonaventure Island, the Magdalens, and the Bird Rocks themselves seemed to offer the best opportunities to the bird photographer, and, accompanied by my best assistant, I departed for the first named on July 2, 1898.

Percé Rock[71] (so named because its base has been pierced by the action of the waves) lies about three hundred feet off the land at the town of Percé, on the west side of the Gulf of St. Lawrence.

A semiweekly steamer from Dalhousie, near the head of Bay of Chaleur, furnishes the regular means of communication with Percé, and the town at once possesses a distinction over any place on the line of a railway. For, aside from every other reason, there is a pervasiveness about the smoke of a railway locomotive which contaminates the atmosphere and robs local influences of half their potency. Doubtless there are persons who would be glad to change the aroma of Percé's fishyards for the stifling air of a railway tunnel, but give me the pungent odor of Percé's drying cod unadulterated.

Even the steamer does not touch Percé, and we were landed by a boat in a sea just rough enough to make the experience interesting. At the pier no hotel agent greeted us, for Percé possesses neither hotel nor boarding house, and summer resorters are almost unknown. This was a delightful discovery. We had come in search of an isolated colony of birds, and we found also an isolated colony of man

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71. Percé Rock from the north.

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—quaint fisher folk whose *patois* French had a gratefully foreign sound.

Lodgings were secured at the home of a retired fisherman, and immediately we sallied forth to pay tribute to the Rock from the nearest point on the mainland. Its size and precipitousness were both surprising and impressive. Seen from the land it seemed like the hull of some great ship which had gone ashore here in the age of the Titans. Nearly three hundred feet high at the bow, with a beam of about one hundred, and a length over all of twelve hundred feet, it was not likely to be boarded by the most nimble seaman.

Doubtless an expert climber, properly equipped with ropes and assistants, might reach the summit; but as the last man to make the attempt, some fifty years ago, lost his life, the town authorities have imposed a fine of five pounds on any one who shall be found guilty of scaling or trying to scale the Rock, and the law, incidentally, protects the birds as well as man.

The top of the Rock is occupied by a colony of probably between two and three thousand Herring Gulls and Double-crested Cormorants. The guide-books array these birds in picturesque cohorts which make the Cormorants' part of the Rock black, the Gulls' white; and they further state that should a black bird chance to trespass on the Gulls' territory, he is immediately surrounded by a consuming white cloud, and *vice versa*. But be it said to the disgrace of man and the credit of birds, that the Cormorants and Gulls nest side by side apparently on terms of the greatest amity.

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At this point it should be stated that my photographic outfit consisted of an ancient but useful 4 × 5 "Waterbury Detective," containing a wide angle, short-focus lens, and designed for general handwork; a 4 × 5 long-focus "Premo" with a 6½-inch trade lens and Unicum shutter, for use from a tripod or in photographing nests, landscapes, etc., and a 5 × 7 twin lens with a 10-inch lens and Prosch shutter, a camera made especially for animal photography, but which was undesirably bulky.

None of these was of service in photographing the inhabitants of Percé Rock from the land, nor could a telephoto be used to advantage, the Rock being so much higher than the adjoining mainland. From a boat near the base of the southeast side of the Rock a better opportunity is afforded for photographing its summit, and the best of several attempts made at this point is here presented.[72] Examined under a glass it conveys some idea of the number of birds occupying the top of the Rock; and while one regrets that the camera does so little justice to the subject, one can not but rejoice that here, at least, is one place to which probably for all time birds may return each year and rear their young in perfect security.

In crevices in the face of the Rock numbers of Guillemots nest, and directly above the pierced opening dwell a colony of about thirty Kittiwakes, who have apparently taken up their residence in the Rock within comparatively recent years, since none were here in 1881 when Mr. William Brewster visited Percé.

Wherever one be about Percé, in the town or

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72. Percé Rock from southeast end. The Cormorants and Gulls may be dimly seen on the summit of the Rock.

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out, the Rock is the prominent feature of the coast line. It dominates its surroundings as a snow-capped mountain rules its dependent ranges. To the bird lover it possesses a double fascination, and one is constantly attracted by the ceaseless cries of the throng of hovering birds, who in some indescribable way seem to invest their home with a sense of the charm, the freedom, the wildness of a sea-bird's life. It is a true *bird* rock; man has no part in it.

At sunset this bond between the Rock and its inhabitants seemed especially strong and real. Through a notch in the western hills the last rays of the sun fell squarely upon the Rock, illuminating it and the ever-present soaring Gulls after the land and the sea were in shadow. Slowly the light left the Rock, until it, too, was of the same gray-blue as its surroundings; then, like the beams from a search-light, it struck the circling mass of Gulls, making them seem a flurry of snowflakes descending into the gloom below.

The pilgrim to Percé Rock will find that the object of his journey not only exceeds in grandeur his brightest imagination of it, but he will be further rewarded by discovering Percé itself and the country round about to be of exceptional interest and beauty. It was the season of codfishing, and every morning a fleet of a hundred or more stanch little boats, each with two men, put out into the bay for a day's fishing. Their return, late in the afternoon, was an eventful part of the day. Then the beach was the center of attraction as boat after boat came in, the men depositing their catch on the sands,

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then setting up their tables and "splitting" the cod with surprising dexterity.[73]

This industry resulted in a singular habit among the Herring Gulls, which, when first seen, I was at a

73. Splitting cod on Percé beach. Percé Rock in the distance.

loss to explain. In a cultivated hillside bordering the town a flock of about fifty Gulls was observed eagerly devouring some food, which was apparently abundant. "Grasshoppers," I thought, but on investigation the grasshoppers proved to be entrails, heads, vertebræ, etc., of codfish, which had been strewn over the fields as fertilizer. The Gulls took wing at my approach, and perched in long rows on the fences; a curious sight, of which I tried, but failed, to secure a picture.

It was through these fields, and along the crests of the red sandstone cliffs northwest of the town,

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that my walks oftenest led me. A few Herring Gulls nested on the ledges, and Mr. Kearton might have succeeded in securing the photographs of them. But I freely confess to an absence of both taste and talent as a cliffman, and was quite content, under the circumstances, to view the birds from above. They, however, had no scruples about approaching me, and uttering a threatening *ka-ka-ka,* which suggested the voice of a gigantic katydid, circled about my head or, with an alarming *swish,* swooped down so near me that I invariably was surprised into "ducking." Here also were croaking Ravens, who seemed by no means shy, and on nearly every fence post was a Savanna Sparrow, by all odds the most abundant land bird observed.

74. Young Savanna Sparrow.

Turning from the cliffs, one soon reached the sprcue and balsam forests, with their twittering Juncos, sweet-voiced White-throated Sparrows, Pine Finches, and numerous Warblers, and following the gently ascending lanes and pathways leading through the fragrant woods, arrived at the shrine-crowned summit of Mount St. Anne, twelve hundred feet above the gulf.

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It is a superb view of boundless sea and forest which greets one from this vantage point—a striking combination of the charms of land and water. To the south, the Bay Chaleur with its broken coast line; to the west, a grand panorama of mountain and valley, all densely wooded—the home of bear, and deer, and caribou; to the north, a foreground of red cliffs and blue water, and, in the distance, Gaspé; to the east, the apparently limitless gulf and, seemingly beneath one, Bonaventure Island, Percé, and the Rock.

It was a view to remember; one, I trust, I may be privileged to behold again. I longed for time to explore the surrounding woods, but Bonaventure with its Gannets wielded a stronger fascination, and two days after our arrival we chartered a cod boat, with its crew, for the voyage to the Gannet rookeries on the eastern side of Bonaventure, distant about four miles.

The evident great strength of our craft in proportion to its size made it seem like a stunted vessel, and her captain and the crew, of one man, seemed built on the same lines. During the winter they were lumbermen in the region north of Ottawa, in the summer codfishers. It is doubtful if they could have selected occupations requiring greater endurance. They seemed as tough as rawhide, and as rough as pirates.

My good assistant they invariably spoke of as "the woman," but both proved true men at heart, and as solicitous for our welfare as though their own lives of exposure had not trained them to laugh at hardship.

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I may seem to give undue attention to the boatmen of a day; but there are days and days in our lives, and with neither my companion nor myself will time dim the memory of the day off Bonaventure.

There had been a heavy blow from the east the night before, the tide was ebbing, and ere we had passed the Rock, and while still under the lee of Bonaventure, our boat began to toss in a very disquieting manner. As we rounded the southwest end of Bonaventure we were more exposed to the action of the waves, but my physical balance was sustained by the anticipation of seeing "two, tree million of bird," which the men declared would soon be visible on the cliffs.

The farther we advanced the less shelter had we from the land, and finally, passing the northwest end of the island, we were at the mercy of the full force of a long rolling sea, which made it impossible to stand, or even sit, without clinging to one's surroundings. At this point, I believe, the promise of the most wonderful sight in the bird world would not have induced me to continue on our course another minute; but fortunately no promise was required, the sight itself existed, and under its inspiration I battled with weak nature for the next half hour with a courage born of enthusiasm and a desire to picture the wonders of the scene before me.

On the ledges of the red sandstone cliffs, which rose sheer three hundred feet above the waves at their base, was row after row of snow-white Gannets on their nests.[75] Their number was incredible, and as we coasted slowly onward, the red walls above

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75. The Gannet cliffs of Bonaventure.

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us were streaked with white as far as one could see in either direction, and the hoarse cries of the birds rose in chorus above the sound of the beating waves. It was a wild picture, which the majesty of the cliffs and the grandeur of the sea rendered exceedingly impressive.

How I longed for the internal composure of my boatmen! One moment I bowed to the waves, the next propped myself against the mast and, held by the captain, attempted to use the twin-lens camera. Water, cliff, and sky danced across the ground glass in bewildering succession, as, like a wing-shot, I squeezed my pneumatic bulb and snapped at the jumping sky line.

One or two exposures were followed by collapse, and in time by partial recuperation, which permitted fresh efforts. In the picture presented the cliff is well shown, but the birds are not so numerous as in others less successful photographically. And during this time how fared my assistant? Charity forbids a reply. I will only say that, in response to a hail from a passing fisherman, our captain shouted, "*Son malade!*"

The supply of 5 × 7 plates exhausted, we came about, and sailing before the wind quickly reached the leeward side of the island, where, under the reviving influence of calmer water, we determined to revisit the Gannets, this time, however, by land.

Disembarking at the fishing village, which is situated on the west side of Bonaventure, we were soon in the spruce and balsam forests, which occupy all but the borders of the island, here about a mile and a half in width. The change from the turmoil

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and vastness of the sea to the quiet and seclusion of the forest made the previous hour's experience seem distant and unreal. The wind which had roared through our rigging now breathed peacefully through the tree tops; the heaving, frothy sea was replaced by stable earth, wondrously carpeted with snow-white cornel and dainty twin-flowers;[76] instead of the harsh cries of the Gannets, we heard the Ave Maria of the White-throated Sparrow. Rarely have

76. Cornel or bunchberry.

the woods seemed so beautiful. Approaching the eastern cliffs, the trees became dwarfed and singularly malformed by the winds. Finally they disappeared altogether, and were succeeded by fields blue with iris. Never have I seen this plant so abundant. There were acres of flowers reaching to the very edge of the cliffs, where, with only a change in the tint, the blue of the iris faded into the blue of the sea.

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We were now nearing the Gannets; desiring to secure a picture of a fully occupied ledge, I urged due caution, and advanced quietly to the edge of the cliff. The point was well chosen—almost directly beneath us, and about halfway down to the sea, there being a broad, rocky shelf so thickly dotted with nesting Gannets that every bird in the group was within reach of his immediately surrounding fellows.[77] It was an astonishing picture of bird life, but only a fragment of what we had beheld from the sea. Under the circumstances, however, this fragment brought more satisfaction than had been before received from the entire Gannet colony.

The 4 × 5 "Premo" was now erected, care being taken to make no move which would alarm the birds, and several exposures were made at leisure. Then changing the lens to an old "Henry Clay," and attaching several elastics to the shutter, I prepared to make a flight picture of the birds as, at the report of my gun, they left their nests. All ready, I took firm hold of the bulb and gave the word to the captain to fire.

The result may fairly be called a failure. As far as we could determine, the birds gave no evidence of hearing the shot or the others which followed, and our best efforts did not succeed in making a single Gannet leave its nest. Like Darwin's Hawk and Moseley's Penguins, these birds seemed happily ignorant of man and his ways. One could doubtless descend to their ledge without causing them to leave it.

It is conceivable that the wearing of Gannets'

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77. A ledge of nesting Gannets. About four hundred birds are shown in this picture.

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heads, or feet, or wings may some day become fashionable, but unless the demand be urgent and the price sufficient to tempt men to risk their lives, the Gannets will long continue to nest on the cliffs of Bonaventure.

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THE MAGDALENS

ROM Percé to the Magdalens by sea is about a hundred and twenty miles, but lacking a proper vessel we were forced to return to Dalhousie and there take the International Railroad to Pictou, where a weekly steamer leaves for Prince Edward Island and the "Madalenes," as the natives call them.

The journey is possessed of both present and historic interest, and the hospitality for which the residents of Pictou are noted assures one of a pleasant stay in their picturesque little town. Here I met a veteran ornithologist—James McKinlay—who, although over threescore and ten and isolated from others of kindred tastes, still possesses the enthusiasm of the genuine naturalist. His collection, the greater part of which he has presented to the Pictou Academy, contains, among other birds, a Brown Pelican, a Corncrake, and a Chuck-will's-widow—all shot in the vicinity.

The Magdalen steamer is neither a yacht nor an ocean greyhound, but answers very well for the short voyage of a hundred and fifty miles across the gulf. Pictou was left at noon, and the following morning we awakened to find the steamer at anchor

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off an island with red sandstone cliffs, and green fields rising gently into hills clad with stunted spruce forests. This was at the southern end of the long sand bar which joins these so-called islands; and our destination, Grand Entry, near the northern end of the chain, was reached late in the afternoon.

At this point we embarked in a small sailboat, and in a driving rainstorm flew before the wind across a bay two miles in width, and up an arm a mile or so in length, to the settlement of Grosse Isle, on the island of the same name. The tide was out; Black-backed Gulls were feeding on the flats, and Gannets fishing in the deeper water; Guillemots rose before the boat; a seal showed itself for a moment and disappeared—moving figures in a picture which impressed itself very vividly on my memory. A landing was made with difficulty, and a walk of nearly a mile through the scrubby spruces brought us to the home of the fisher folk, who had agreed to take us in.

If Percé is isolated, Grosse Isle is in another sphere. Even the weekly steamer which plies between Pictou and the Magdalens from May to November comes no nearer than Grand Entry, and its arrival seemed a rather vague incident, made real only by the appearance of mail.

The lobster season had just closed, the "pots" were piled in heaps on the beaches, and mackerel fishing was now the presumable industry of the male population of Grosse Isle. But few fish were running, and each day boat after boat of glum-looking men came in from the sea with often only a few cod to show for their labor. This, however, was midsum-

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mer, and the Grosse Isle "season" was in full swing. There was a school picnic one day; on another, service was held in the little white church on the hillside; but, as I considered the deathlike quiet which, as a rule, reigned in the village, I wondered what life must be there in winter. Then the entire Magdalen group is frozen in a sea of ice, which renders communication with the mainland (except by cable, generally out of repair) impossible. When the ice breaks in the spring, seals appear and furnish a hazardous occupation to those who are venturesome enough to go in pursuit of them—a form of sport which I imagine is eagerly welcomed after the lethargy of winter. With us the Magdalens were only a stepping-stone to Bird Rock, but while preparing for the continuation of our journey to that point we took some note of our surroundings.

78. Nest and eggs of Fox Sparrow.

The Magdalens have an interesting avifauna, but

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it was now the latter half of July and the song season of most species was over. Fox Sparrows, however, were still singing, and their clear, ringing whistle came from the spruces all about. The fogs, so characteristic of the region, seemed in no way to dampen their spirits, and when the gray mists closed in thick about us their notes rang out as cheerily as though the sun shone from a blue sky.

My short excursions, however, were largely made along the beaches in search of some sea waif, and for the shore birds that would soon migrate through these islands in large numbers, or to the cliffs where the Guillemots were nesting. The latter were comparative strangers to me, and I had not become accustomed to the plump, black, white-winged, little birds that sat so lightly on the water. They nest in scattered pairs, in crevices, in the face of the cliffs, where my guide, Mr. Shelbourne, a resident collector, was particularly apt at discovering them.

Grosse Isle is not beyond the range of the nest-robbing small boy, and only the few Guillemots that had contrived to escape him now had young. They were feeding them on sand eels, and with bills full of their shining prey made frequent visits to their nests. The young varied in development from those as yet covered only with the scanty natal down to others half grown and with the black and white second plumage appearing beneath. They were active enough to test the temper of the most patient bird photographer, and the accompanying picture was secured only after many trials.[79]

In the meantime we were endeavoring to make some arrangements for our voyage to the Rock,

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which on clear days could be seen from the tops of the higher hills—a hazy dot in the sea. Imagination peopled the view with Cartier, Audubon, and his successors, and I could scarcely believe that the scene of the wonders they had described was actu-

79. Young Guillemots.

ally on my horizon. But, although only twenty miles away, Bird Rock now seemed more distant than before we had taken the first step of our journey. This in a measure is due to the uncertainty of gulf weather, the strong tides, the sudden and severe

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squalls, the prevalence of fogs, and the surprising rapidity with which the latter change a sunlit horizon to closely crowding gray walls—all of which make navigation in these waters more than usually dangerous. Furthermore, it is to be remembered that Bird Rock is not a port in which one could seek safety from a storm, but a spot to be approached only in the calmest weather. One might therefore start for the Rock under the most favorable conditions, be caught in a squall and, as a result, find one's self at sea with the recently desired haven changed to an element of danger.

With the Rock glimmering in the sunlight and apparently almost within reach, it was not easy to believe tales of disaster which had befallen those who in small boats had attempted to reach it, and I was more impressed with its inaccessibility by the fact that only one of the many fishermen with whom I talked, had ever landed on this inhospitable resort of sea birds.

This man proved a friend in need—one Captain Hubbard Taker, of the thirty-ton schooner Sea Gem. I commend him to every visitor to the Magdalens as a man and a sailor. It was when the difficulties of reaching the Rock by small boat appeared insurmountable that Captain Taker returned from a fishing trip to the Labrador coast. He proved to be one of those rare but exceedingly satisfactory individuals with whom anything is possible, or at least who believes it is until the contrary is shown. Could he take us to Bird Rock? "Why, of course; and whenever you are ready." So without delay we boarded the Sea Gem.

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BIRD ROCK

IF as a result of a conference between the birds and the Audubon Society a home were to be selected which should prove a secure retreat for certain of the feathered kind, I imagine that Bird Rock, in its primal condition, would have admirably filled the requirements set forth by both conferees.

With precipitous, rocky walls weathered into innumerable ledges, shelves, and crevices—all fit nesting sites—one might think of it as a colossal lodging house for the countless sea-bird tenants who find here not only a suitable place for the reproduction of their young, but in the surrounding waters an abundant and unfailing supply of food. Add to these conditions the Rock's isolation and inaccessibility, its shoreless outline, and the difficulty with which it may be ascended, and we have indeed an ideal refuge for sea fowl, one in which, unless they were subjected to special persecution, they might have continued to exist for centuries, had not the transforming influences of civilization reached even to this isle of the sea.

Bird Rock is about fifty miles northwest of Cape Breton, the nearest mainland, and twelve east of

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Bryon Island, its next neighbor in the Magdalen group, to which it belongs. It is three hundred and fifty yards long, from fifty to one hundred and forty yards wide, and rises abruptly from the sea to a height of from eighty to one hundred and forty feet. Its outline, the nature of its base, sides, and summit are well indicated by the accompanying pictures.

80. Bird Rock from the southwest; distant about one half a mile.

Three quarters of a mile northeast of Bird Rock, or Great Bird, as it is more specifically called, lies Little Bird, a red sandstone rock which at high tide, or from a distance, appears as two. The shallow water between Great and Little Birds suggests the

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possibility of a past connection and the probability that in some future geological age the waves will have completed their work of destruction, when both islands will have disappeared.

The history of these bird-inhabited islands is interesting, and gives us some information of the changes which man has wrought in their bird life. It begins with the account given by Jacques Cartier of his voyage to Canada in 1534. Of the Bird Rocks he wrote: "We came to three islands, two of which are as steep and upright as any wall, so that it was not possible to climb them, and between them is a little rock. These islands were as full of birds as any meadow is of grass, which there do make their nests, and in the greatest of them there was a great and infinite number of those that we called Margaulx, that are white and bigger than any geese, which were severed in one part. In the other were only Godetz, but toward the shore there were of those Godetz and great Apponatz, like to those of that island that we above have mentioned. We went down to the lowest part of the least island, where we killed above a thousand of those Godetz and Apponatz. We put into our boats as many as we pleased, for in less than one hour we might have filled thirty such boats of them. We named them the islands of the Margaulx."

Concerning this quotation Mr. F. A. Lucas remarks (The Auk, v, 1888, page 129): "While this description, as well as the sentences which immediately precede it, contains some statements that apparently are at variance with existing facts, there is nevertheless good reason to believe that Cartier

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here refers to the Bird Rocks in the Gulf of St. Lawrence. The birds called Margaulx, which bite even as dogs, were Gannets, whose descendants, in spite of centuries of persecution, are to be found to-day nesting where their ancestors did before them.

"That Cartier's description does not accord with their present appearance is not to be wondered at. The material of which they are composed is of a soft, decomposing, red sandstone that succumbs so easily to the incessant attacks of the sea that Dr. Bryant's description of them in 1860 does not hold good to-day. If, then, the Bird Rocks have undergone visible changes in twenty-five years, it is easy to imagine how great alterations the islets may have undergone during three and a quarter centuries."

Examination of the narratives left by other early voyagers in this region would yield further information concerning the Rocks and the destruction of its inhabitants; but passing to records of greater ornithological value, we find that Audubon, whose energy in exploration no ornithologist has ever surpassed, was the first naturalist beholding Bird Rock to leave us a description of its wonders. It was during his cruise to Labrador in the schooner Ripley that he wrote in his journal, under date of June 14, 1833, the following graphic account of the day's experiences:

"About ten a speck rose on the horizon, which I was told was the Rock. We sailed well, the breeze increased fast, and we neared this object apace. At eleven I could distinguish its top plainly from the deck, and thought it covered with snow to the depth of several feet; this appearance existed on every

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81. North side of the Rock, west of the crane.

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portion of the flat, projecting shelves. Godwin said, with the coolness of a man who had visited this Rock for ten successive seasons, that what we saw was not snow, but Gannets. I rubbed my eyes, took my spyglass, and in an instant the strangest picture stood before me. They were birds we saw—a mass of birds of such a size as I never before cast my eyes on. The whole of my party stood astounded and amazed, and all came to the conclusion that such a sight was of itself sufficient to invite any one to come across the gulf to view it at this season. The nearer we approached the greater our surprise at the enormous number of these birds, all calmly seated on their eggs or newly hatched brood, their heads all turned to windward and toward us. The air above for a hundred yards, and for some distance around the whole Rock, was filled with Gannets on the wing, which, from our position, made it appear as if a heavy fall of snow was directly above us." (Audubon and his Journals, i, p. 360.)

From his pilot, Godwin, Audubon secured some information concerning the Gannets that then nested on the top of the Rock. He writes: "The whole surface is perfectly covered with nests, placed about two feet apart, in such regular order that you may look through the lines as you would look through those of a planted patch of sweet potatoes or cabbages. The fishermen who kill these birds to get their flesh for codfish bait ascend in parties of six or eight, armed with clubs; sometimes, indeed, the party comprises the crews of several vessels. As they reach the top, the birds, alarmed, rise with a noise like thunder, and fly off in such a

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hurried, fearful confusion as to throw each other down, often falling on each other until there is a bank of them many feet high. The men strike them down and kill them until fatigued or satisfied. Five hundred and forty have been thus murdered in one hour by six men. The birds are skinned with little care, and the flesh cut off in chunks; it will keep fresh about a fortnight. So great is the destruction of these birds annually that their flesh supplies the bait for upward of forty fishing boats which lie close to Bryon Island, each summer."

This slaughter was evidently attended by some danger, for not only did the sitting birds bite viciously, but old fishermen in the Magdalens state that if the invader of the Gannets' domain on the summit of the Rock should have happened to be caught in a rush of stampeded birds, he could with difficulty have avoided being carried off the edge of the cliff.

In concluding his description of the Rock, Audubon says: "No man who has not seen what we have this day can form the least idea of the impression the sight made on our minds." One need not be a naturalist, therefore, to realize the depth of his disappointment when the pilot told him that the wind was too high to permit them to land on the Rock. However, they did not leave without at least making an attempt. A boat was launched, manned by the pilot, two sailors, Audubon's son John, and Tom Lincoln, for whom Lincoln's Finch, discovered subsequently in Labrador, was named; but after an hour's absence they returned without having made a landing, and the increasing force of the wind com-

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pelled them to continue their voyage to the northward.

Apparently the first naturalist to set foot on Bird Rock was Dr. Henry Bryant, of Boston, who landed there June 23, 1860. This was before the days of the lighthouse, and Dr. Bryant reached the top of the Rock only after a climb which he characterizes as both "difficult and dangerous." In addition to the Gannets, which he found resting on the ledges on the face of the Rock, he found these birds nesting over the entire northerly half of the summit, and after measuring the surface occupied by them, he estimated that this one colony alone contained no less than one hundred thousand birds, while the number living on the sides of the Rock and Little Bird he placed at fifty thousand.

The position of the Rock, at the gateway to Canadian ports, makes it particularly dangerous to vessels plying in these waters, and in 1869 a lighthouse was erected on its summit. While constructing the light keeper's dwelling and storehouses, the Government built two cranes—one on the northerly, the other on the southerly side of the Rock—for use in hoisting supplies. There are also now three other places where by means of ladders and ropes one may ascend. The top of the Rock was thus made more accessible, and the birds were consequently less protected from the attacks of fishermen. It is said, also, that the light keepers did not appreciate the companionship of the Gannets, and made special efforts to drive the birds from the nesting site which they so long had held undisturbed.

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Hence, when Mr. C. J. Maynard visited the Rock in 1872, he found that the colony of Gannets on its summit contained only five thousand birds, which, nine years later, Mr. William Brewster reports had decreased to fifty pairs. Mr. Brewster also noted a

82. A corner of the Rock.

fresh cause for the destruction of the eggs of the birds nesting on the sides of the Rock, in the shape of a cannon which had been introduced shortly before his visit. He writes: "At each discharge the frightened Murres fly from the Rock in clouds,

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nearly every sitting bird taking its egg into the air between its thighs and dropping it after flying a few yards. This was repeatedly observed during our visit, and more than once a perfect shower of eggs fell into the water about our boat." While the birds have become comparatively accustomed to the report of the guncotton bomb, which has succeeded the cannon, large numbers still leave the Rock each time a bomb is exploded, so that it continues to be a means of destroying not only eggs but young birds, which are carried off the narrow ledges by the precipitous flight of their parents.

Since that date (1881) Cory, Lucas, Palmer, Bishop, and doubtless others, have visited Bird Rock, but with the entire disappearance of the Gannets from its summit no attempt has been made to estimate the further decrease in the number of its feathered inhabitants.

In spite of the great diminution which this outline of its history shows to have occurred in Bird Rock's population, the casual observer of to-day will believe with difficulty that it could ever have been more densely inhabited. It is still one of the ornithological wonders of our Atlantic coast, and, comparatively speaking, as well worth visiting as in the time of Audubon.

Writing now in the light of experience, I anticipate a return to Bird Rock with even more enthusiasm than I felt when after the discouraging uncertainties of delay we boarded the Sea Gem on the afternoon of July 23d, and with a fair wind set sail for Bryon, where we were to anchor for the night.

What a stanch, powerful vessel the little schooner

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seemed when compared with the fishing boats in which we had at first prepared to make the voyage! Investigation below, however, did not seem to offer prospects of undisturbed repose, and reaching Bryon late in the afternoon we decided to go ashore and apply to the island's owner for a night's lodging. Bryon Island, with its several thousand acres of stunted spruce and balsam forests, its rolling pasture lands and grazing cows and sheep, its precipitous red sandstone cliffs rising to a height of two hundred feet from the sea and furnishing a home for a few Murres and Puffins, is the property of one man, who purchased it from the Government for a nominal sum. A lobster cannery furnishes employment for twoscore or more itinerant fishermen and laborers, who after the lobstering season ends in July remain for the mackerel fishing. When they have departed the population of Bryon is reduced to about half a dozen families, over whom the owner reigns supreme.

We landed at the cannery and wended our way over a path through the stunted forests, which at the end of a mile or more led us to the monarch's home—a small frame house adjoining large barns.

The ruler of Bryon proved to be absent in the Magdalens, but his wife made us both welcome and comfortable. We recall with pleasure the night passed beneath her roof, and the magnificent view of the setting sun from Bryon's red cliffs.

We awoke in the clouds, gulf clouds, which so often in swift-spreading banks envelop both sea and land in this region. It was ten o'clock before the sun could force its way through them, and when

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we returned to the Sea Gem we found the captain impatient at our tardiness. We explained that of course we did not suppose that he would care to start in so dense a fog, but he laughed at us. "Fog!" What had fog to do with sailing when the wind was favorable? Later he gave us an exhibition of seamanship in a fog which deeply engraved the name of Captain Taker on our memories.

However, the wind still held from the right quarter not only for the run to the Rock, but for a landing on its one bit of beach, and we quickly hoisted sail for this last stage of a long journey.

For two hours we watched the Rock grow slowly larger, then its outlines more rapidly assumed individuality, the lighthouse and other buildings on its summit took definite form, its rocky ledges were seen to be lined with rows of white Gannets, and Bird Rock became for us a reality. The storm of circling birds which Audubon described is not to be seen to-day, but enough are left to quickly exhaust our stock of adjectives.

A British flag was displayed from the tall staff near the lighthouse. If it had been marked with stars and bars it would have looked less like a signal set as a greeting from the island's keeper to his unknown guests.

A figure on the rock now vigorously motioned us toward its only landing place, and heaving to the schooner we dropped a dory overboard and sent Captain Taker ashore as our emissary to treat with the representative of the Canadian Government, and explain to him that through the courtesy of his chief, the Hon. J. U. Gregory, we were empowered

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to invade the territory under his control. At the end of half an hour a large dory, manned by two oarsmen, appeared from behind the Rock and headed for the schooner. In the stern was Captain Taker, in the bow a stranger whose face was eloquent with an unspoken welcome. This was Keeper Captain

83. The landing at the base of the Rock, showing crate.

Peter Bourque. If we had been at the head of the Lighthouse Board itself, he could not have received us more cordially. What a hunger he had for news! Nearly two months had elapsed since he had heard from the world—months rich with the history of the defeat of Cervera and surrender of Santiago.

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Our outfit was speedily placed in the dory, and with the Rock and its birds now looming high above us, we pulled for the bit of rock-fringed beach which

84. The landing on top of the Rock, showing crane. The Kittiwakes at the bottom of the picture are shown in No. 85.

constitutes the only available landing place. It was already evident that the island offered endless opportunities to the bird photographer, and as each

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stroke of the oars brought us nearer I felt a sense of exultation, such perhaps as a miner experiences when he discovers that his claim promises an assured fortune. The boat was beached with a rush, and landing at the base of the cliff,[83] which rose like a wall somewhat over one hundred feet above us one could realize the danger attending an attempt to land here in anything but the calmest weather. We were now introduced to the car or basket in which we were to make actually the final stage of our journey. It seemed a frail, cratelike affair of light strips of wood, and measured about two and a half feet square and three feet high. After our cameras, plates, gun, ammunition, etc., had been snugly stowed, we obeyed the direction to enter the crate and take seats on bits of board placed across opposite corners. The end of the long, dangling rope was attached, in response to Captain Bourque's roaring "Hoist away!" a faint reply came from the tiny figure which in a sickening way had been leaning over the edge of the rock above, watching our proceedings, and a moment later the rope tightened, strained, and we were clear of the ground and slowly rising. A long experience in elevators had made me anticipate this part of the Bird Rock journey without concern, but the instant after the ascent began I discovered that we were not only going up but around as well, and the twisting motion was so novel, so unlike anything to which I had previously been accustomed, that I confess to a feeling of surprise, to say the least. The sudden jars, as the rope in winding slipped off the preceding coil and dropped suddenly, perhaps an inch, gave us a sufficiently

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clear idea of the feelings which would attend the beginning of a fall, and it was with a decided sense of having had a narrow escape that, on being hoisted slightly above the level of the summit of the Rock, we saw the arm of the crane[84] pulled inward, bringing the crate over the land, to which we were gently lowered.

The twenty years which have elapsed since Cory visited the Rock have reduced the time required for the ascent from twenty-seven to six minutes. The world moves, therefore, even at Bird Rock.

To a naturalist this slow passage through the air, about six feet from ledge after ledge, crevice above crevice, filled with Kittiwakes,[85] Murres, and Razorbills, with great white banks of snowy Gannets on either side, possesses an almost stupefying fascination. The birds were so abundant and showed such entire lack of fear, I seemed to have reached, if not the heart, at least one of the most important centers of the bird world.

Alighting from the crate, we were greeted by Mr. Bourque's two assistants and his daughter, a girl of sixteen, who, with a third assistant, now absent on leave, completed the population of the island. There should be added, however, one cow—an important member of the Rock colony, who had reached her elevated position in life by means of the same apparatus with which we had just gratefully parted company. Numerous buildings,[86] which we had barely noticed from the sea, were found to form a miniature village on the grassy, nearly level summit of the Rock, giving to the scene an atmosphere

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85. Kittiwakes and young on nests. From the crate.

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of comfort and homeliness which strongly emphasized one's sense of isolation.

The favorable light prevailing at the time of our arrival was far too valuable to be used for anything but photography. No sooner, therefore, was our luggage removed from the crate than, without wait-

86. The lighthouse, keeper's dwelling, and other buildings.

ing to inspect our quarters, I made ready the cameras and plate-holders. The latter, numbering twenty-one, furnished forty-two glass plates. I wished for twice that number before the day ended. Going to the western end of the Rock, now brightly illumined by the afternoon sun, I found that the jutting, shaly ledges permitted one to descend easily, and in a moment I was in the midst of groups[1] of Puffins, Razorbills, Brünnich's and Common Murres, who apparently regarded me with as much surprise and interest as I did them, and exhibited

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an astonishing confidence in mankind. In fact, I was at times vigorously scolded by some Murre parent, who waddled toward me, bobbing her head,

87. Razorbilled Auks and "Ringed" Murre. × 3.

and uttering a series of protesting *murres* in a tone so like that of a bass-voiced man, I half expected a larger biped to appear.

The Razorbills were fully as tame, sometimes leaving their crevices in the cliff and, with a hoarse croak, almost flying in my face, while the Puffins exhibited a spirit of combined indifference and independence, which plainly said, "This Rock is ours."

I sat down on a convenient ledge, and as the birds gathered about me in rows and groups on the border of the cliff, its ledges and projections, I seemed almost to be on speaking terms with them.

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So unusual and pleasing was this experience of having birds admit me at once to the inner circles of their society that I felt as though I had indeed been initiated into their ranks; and my enjoyment of the strange scene was heightened tenfold by the knowledge that I could satisfactorily record it. So I prepared the twin-lens—a camera exactly adapted to my present needs—and at a distance of twenty feet or thereabouts loaded and fired as many times as I pleased, with the birds none the wiser, and offering me each moment some new picture differing in composition from the last. Here was a triumph for the bird photographer. Who so nearly could have done justice to the subject? The taxidermist? One shot would have broken the spell? The artist? Whose pencil could compete with the lens in the convincing realism of its impression?

But as yet I had seen only a fragment of the Rock. Climbing, therefore, from ledge to ledge, I reached a corner where an abrupt turn exposed a great expanse of perpendicular wall so inaccessible to man that it had become a favorite nesting site for the birds.[82] Here were gathered Gannets, Murres, Razorbills, and Kittiwakes, distributed singly or in rows, according to the nature of the shelves or ledges on which they were nesting, the Gannets taking the widest, the Murres and Kittiwakes the narrowest ledges, while the Razorbills sought the more sheltered crevices.

What noise and seeming confusion were here! A never-ceasing chorus in which the loud, grating *gor-r r-rok, gor-r r rok* of the Gannets predominated, while the singularly human call of the Murres and

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the hoarse note of the Razorbills formed an accompaniment. Occasionally the Kittiwakes found cause for excitement, and hundreds of birds swooped downward from their nests and circled about, calling their

88. Puffins. × 2.

rapidly uttered, distinctly enunciated *kít-ti-wake, kít-ti-wake.*

In addition to the great number of birds resting or nesting on the Rock, an endless procession of Gannets, Puffins, and Razorbills were flying around, but never over it. Unconsciously one expected a pause in this whirling throng, but although its numbers fluctuated, birds were always passing. The exposure of my last plate recalled me to a sense of other duties, and when I had returned to the little group

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of buildings with their inhabitants, I seemed to have been in another sphere.

My object in visiting Bird Rock was not only to secure pictures of its bird life, but a certain number of birds for the American Museum of Natural History, where it is proposed to represent a portion of the Rock with its tenants. During my absence in the world of birds my good assistant had turned one of the supply houses into a laboratory, and was already at work preparing specimens with which the active Shelbourne and attentive keepers had plentifully supplied her.

A gun was necessary only in securing Gannets and Kittiwakes, the Murres and Razorbills being caught in a dip-net by the keepers; one of whom, having a rope about his waist which was held by his associate, advanced to the edge of the cliff or "cape," as it is termed locally, and looked cautiously over in quest of the birds resting on the ledges immediately below. Having learned their position the net was thrust quickly downward, and the birds, in attempting to escape, often flew directly into it and became entangled in its meshes. Puffins were captured on their nests in crevices in the face of the Rock or in the holes they had burrowed in the earth on the top. The latter were sometimes shared with Leach's Petrel, who also occupied small burrows of their own.

The schooner had dropped anchor near the Rock, but the wind increasing in strength, Captain Taker set sail for the lee of Bryon, and at midnight, when we concluded our day's work, there was a promise of a stormy morrow, which daylight fulfilled. The

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wind drove the waves to the rock-set base of our islet with terrific force, making landing or departure out of the question. We had come just in time. The light prohibited successful photography, and the day was devoted to collecting and preserving specimens and exploring the Rock.

We had arrived in the height of the nesting season, all of the seven species breeding on the Rock having eggs and young in various stages of development. It was evident, however, that the number of eggs and young was small as compared with the number of adults, a condition which was explained by Captain Bourque's statement, that he thought about five thousand eggs had been taken from the Rock by fishermen that year. These were the eggs of Murres and Razorbills, the former being the most abundant birds on the Rock. Both the Common and Brünnich's Murre were present, but I am unable to say which was the more numerous. There were also a few of the singular, so-called "Ringed" Murres,[87] a bird whose standing is in doubt, some ornithologists regarding it as a distinct species, others as an individual variety.

89. Murre's egg.

Both species of Murre laid their single peculiarly marked eggs on the bare shelves or ledges in the

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most exposed situations;[89] and seeing them now for the first time in Nature, I was quite willing to accept the theory which has been advanced to account for their markedly toplike or pearlike shape. A round or elliptical egg, laid in the situations often chosen by the Murres, would, when moved by the wind or incubating bird, readily roll from its precarious position, but the pointed egg of the Murre when disturbed describes a circle about its own end. Thus, like a diplomat, it seemingly yields to superior force while retaining its original position. The eggs vary in color from greenish blue to buff, and are strikingly scrawled and blotched with shades of chocolate. No two are alike, a fact which it is supposed may aid the parent Murre in distinguishing her own egg among the dozens with which it may be placed.

90. Young Murres and egg.

The few eggs seen were doubtless laid by birds which had been robbed earlier in the season, but young were found in every stage, from the newly hatched downy chick,[90] who sat on his narrow ledge

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vigorously screeching for food, to others half grown and with the natal down almost entirely replaced by the first winter plumage. The parents were still in attendance on the oldest birds, and no young were seen in the water.

91. Kittiwakes and young on nest. From the crate. × 2. An enlarged detail of No. 85.

Razorbills, perhaps because the Rock contained comparatively few of the sheltered nooks they require for nesting sites, were less abundant than Murres. Their downy young were much lighter in color than the young of the Murres and their high squealing whistle could easily be distinguished from the screech of the young Murres. Of two specimens which had nearly completed the acquisition of their winter plumage, one had the white line from the eye to the bill so characteristic of the adult fully developed, while in the other it was wholly wanting—a

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variability in marking which suggests that the white stripe of the Ringed Murre is a similar individual peculiarity.

Next to the Murres the Kittiwakes are probably the most numerous birds on the Rock. Doubtless for the reason that they select the less accessible ledges where their eggs can not be so readily taken, their young were more advanced than those of any other of the birds breeding here. Their nests, rather bulky structures of seaweed, which often projected well over the edge of the ledge on which they were built, contained only young with their parents, one or two birds constituting a brood.[91]

Kittiwakes were never observed perching on the upper ledges or rim of the Rock in the situations commonly selected by Murres, Razorbills, and Puffins. The last-named species, in fact, was never seen

92. Entrance to Puffin's burrow.

resting far from the top of the Rock, and its nests were placed in burrows excavated on the summit of the Rock, at the west end. Occasionally advantage

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was taken of an opening beneath a ledge, but generally the bird excavated a hole,[92] about four inches in diameter and three or four feet in length, at the end of which we found the nest of grasses and feath-

93. Puffin's nest and egg at the end of excavated burrow.

ers, with its single elliptical white egg[93] and sitting bird, or a sooty, down-covered nestling.[94]

Woe to the unsuspecting person who thrusts his hand into the jaw, one might say, of an incubating Puffin. Nature has not only provided the bird with an uncommonly powerful and efficient pair of mandibles, but also with a disposition which prompts it to use them to the best advantage. Never have I seen anything in the shape of a bird so diabolically vicious as a Puffin. An individual which we captured alive and attempted to study in our workroom, proved altogether too fierce a creature to have

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about, and its hoarse voice—half grunt, half groan —added to its unattractiveness.

In Nature, however, their trim appearance was very pleasing; *Paroquets*, the French-Canadians call them, and one has only to see the bird in life to appreciate the applicability of the name. It is not alone their looks but also their actions which suggest the Parrot. Unlike the Murres and Razorbills, they do not rest on the whole foot, but stand quite erect on the toes alone, and run about with the characteristic pattering steps of Parrots. When the wind blew fresh from the sea they often faced it, hovering a foot or two above the rocks on outstretched, motionless wings, and retaining for several seconds this perfect balance between gravity and air pressure.

94. Young Puffin on nest at the end of burrow.

It is quite possible that I may have wholly misjudged the Puffin's character, and that when unmolested their nature is peaceable in extreme. At any rate, they seem to be not only on excellent terms with their own kind, but with the very distantly related Leach's Petrels, with which they sometimes

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shared their underground homes, one bird's nest being at the end of the burrow, the other about half way to the entrance. The Petrels also occupied burrows of their own, which, judging from the actions of the birds found in them, they had excavated by the aid of their toes.[95]

The Petrel's nests were composed of fine grasses and a few feathers, and one nest contained two bits of white birch bark, the presence of which raised the question as to whether these gleaners of the sea do not gather suitable nesting material when they find it floating on the surface of the water. Two of

95. Leach's Petrel on nest at end of excavated burrow.

the eight or ten Petrels' nests examined contained a single white egg; one egg constituting a full set with this species, as with all the other rock-nesting birds, except the Kittiwake. The remaining nests

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were each occupied by a newly hatched young bird—a gray ball of down, so unlike anything in feathers I had ever seen that, if it had not been for their tiny, young chicken-like *peep*, I should have been inclined to pass it by as a wad of gray cotton.[96] Never more than one of the parent birds, either the male or female, was found on the nest, nor was a single Petrel seen about the Rock during the day.

96. Young Leach's Petrel removed from burrow with nesting material.

The Puffins and Petrels are now the only birds nesting on the summit of the Rock, not a single descendant of the one hundred thousand Gannets which, according to Bryant, occupied the top of the Rock in 1860 now being found there. To-day this species nests only on the less accessible border ledges on the face of the Rock, where they are grouped in colonies. Most of them were incubating, but several were brooding their young, which ranged in size from the naked, black-skinned, newly hatched chick to those that had acquired the white, swan's-downlike first plumage.[97]

With the exception of two white, black-spotted birds, all the Gannets seen, both on Bird Rock and Bonaventure, were in the adult white plumage, and if, as has been stated, this plumage is not gained

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until the bird is two years old, the question arises, What becomes of the immature birds during the nesting season ?

97. Young Gannet.

An estimate of the number of individuals representing the seven species just mentioned as nesting on the Rock, is perhaps not warranted by my brief experience, nor should I attempt to give one, did not my photographs permit me to count with a fair degree of accuracy the number of birds in view on that part of the Rock shown in these pictures. Time was lacking to make, from a boat, a series of photographs of the Rock which would include all its bird-inhabited portions, and the appended estimates are based on the results of a count of the birds in photographs of about one half the occupied area. Murres, Razorbills, and Puffins can not be distin-

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guished in these pictures and are therefore grouped under one head, it being calculated that about from fifteen hundred to two thousand individuals of these species make the Rock their home. Of this number probably not more than one hundred are Puffins, while the Common and Brünnich's Murres (*Uria troile et U. lomvia*) outnumber the Razorbills at least four to one.

The Kittiwake population of the Rock probably numbers between six hundred and eight hundred

98. Gannets. × 3. An enlarged detail of No. 99.

birds; of Gannets, there are perhaps left only fifteen hundred of the more than one hundred thousand

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birds which Dr. Bryant writes of as living on the top of the Rock alone; and of Petrels, not more than fifty.

When on the Rock I should have said that it was tenanted by at least ten thousand birds, and I was not a little surprised to find that the evidence furnished by my photographic records gave a total of about four thousand birds. However, the sight of four thousand birds domiciled in one small islet is sufficiently impressive to increase the pulse beat of the most phlegmatic traveler; and even if this estimate be too large, the Rock's merits as a bird resort are too substantial to be affected by any decrease in it which truth demands.

To return to an account of the day's doings, the light, as has been said, was unfavorable for photography, and the time was devoted to collecting and preparing specimens and making a hurried survey of the bird rookeries on the Rock, with results briefly set forth above; but late in the afternoon the sun gave indications of its whereabouts behind the clouds, and I immediately substituted the camera for the scalpel, and had Keeper Bourque lower me in the crate in order that I might secure photographs of the birds observed on our ascent.

Neither the stability of the crate nor its constant turning were conditions which a photographer would choose, and, without the twin-lens it would have been impossible to secure pictures of the Kittiwakes[85] and Murres, who in a surprised but unalarmed manner regarded me from their nests on the Rock, in some instances at a distance of not more than six feet.

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At ten o'clock at night I visited the west end of the Rock to see and hear the Petrels that nest there. The casual visitor to Bird Rock would be quite unaware of the presence of these birds; indeed, one might live there for years without knowing that Petrels made it their home. As far as the Rock is concerned, the birds are strictly nocturnal; but as usually only one bird—either male or female—is found on the nest, it is supposed that its mate is at sea feeding. If this supposition be true, I am at a loss to account for the entire absence of the birds during the daytime. Why should they not return to their nests before nightfall? And if, as stated, the sea bird takes the place of the nest bird, does the latter always feed at night and the former by day, or do they sometimes change about, thus making the same individual both nocturnal and diurnal in habit?

However this may be, I had no sooner reached the part of the Rock tenanted by the Petrels than I was given the most surprising evidence of their activity during the night. From the ground at my feet and on every side there issued the uncanny little song—if I may so call it—of birds doubtless sitting at the mouths of their burrows. It was not like the cry of a sea bird, but a distinctly enunciated call of eight notes, possessing a character wholly its own, and not to be compared to the notes of any bird I have ever heard, though at the time it impressed me as having a certain crowing quality. Such a call might be uttered by elves or brownies. Occasionally I saw a blur of wings as a bird passed between me and the lighthouse.

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Later, the fog, which had been scudding over us in wisps and ribbons, closed in, and through the medium of a guncotton bomb the Rock gave notice

99. Gannets on nests.

of its presence to the mariners who might be in the surrounding waters. Captain Taker heard the dull, booming voice as with disappointing promptness he

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came to take us from the Rock, and early in the morning we heard his fog horn from the gray bank below telling where the Sea Gem, as yet unseen, was anchored.

In the hope of better weather I deferred photographing the Gannets, the only accessible colony of which was on the north side of the Rock; but forced now to make the best of the existing conditions, I took the twin-lens, fastened one end of a rope about my waist, and gave the other end to Captain Bourque, in order that, unhampered by thought of fall, I might creep along the slippery ledges where the birds nested.[99]

The fog had lifted, but the day was gloomy, and only the white plumage of the birds and a wide-open lens yielded successful photographs.

It was my first visit to the big white birds, who, in spite of persecution, have as yet acquired but little fear of man, and as with hoarse croaks and a dashing of wings they pitched onto the narrow ledges near me, their size and boldness, in connection with my somewhat insecure footing, aroused in me a feeling which I had not experienced when surrounded by the smaller Murres, Auks, and Puffins. The main nesting ledge was out of reach below, but small groups of birds were nearer, and these I photographed at a distance of about ten feet.[100]

These Gannets are magnificent birds, and when on the wing exhibit a combination of power and grace excelled by no other bird I have seen. They are most impressive when diving, as with half-closed wings, like great spearheads, they descend from a height of about forty feet with a force and speed

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100. Gannet on nest. Two nests in foreground.

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that takes them wholly out of sight, and splashes the water ten feet or more into the air. Cory graphically compares the sight of a distant flock of Gannets diving at a school of fish, to a continuous stream of beans poured from a pail.

Captain Bourque tells me that Gannets are no longer used for bait by the codfishers; but when one realizes that only two colonies of these grand birds, comprising a few thousand individuals, are all that are left of the species in this hemisphere, one could wish for these survivors something more than negative protection.

In the afternoon the weather gave promise of clearing, and entering the crate we were swung out over the edge of the Rock on the first stage of our homeward journey. The collections and outfit were placed aboard the schooner, while in a dory we attempted to visit Little Bird; but before we had rowed a quarter of a mile the fog crept back, Great Bird slowly disappeared from view and became only a periodic boom in the gray wall, and we returned to the schooner without delay.

The sail to Bryon, where we passed the night, apparently demonstrated Captain Taker's possession of the sense of direction. In spite of a head wind, violent squalls, and a strong tide, he made his way through the fog with perfect assurance and dropped anchor at a particular lobster buoy, visible less than fifty yards from the schooner, but which in effect he appeared to have seen before we left the Rock. It was a remarkable bit of seamanship.

In Bird Rock the Canadian Government possesses an object of surpassing interest, one which, south of

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Greenland, is unique in eastern North America. It is the obvious duty of the proper authorities to preserve it, and the ease with which this can be done makes further neglect inexcusable. The appointment of the light keeper as a game warden is the only step required to make Bird Rock a safe retreat for sea fowl, until, in some future geologic age, it shall have yielded to the relentless attack of the waters.

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LIFE ON PELICAN ISLAND, WITH SOME SPECULATIONS ON THE ORIGIN OF BIRD MIGRATION

THE study of isolated colonies of birds, particularly of those situated on islands, throws much light on several as yet little-understood problems of bird migration.

With mainland birds of general distribution—the Robin, for example—the individual is, except when nesting, lost in the species, and unless the bird be peculiarly marked who can say whether the Robins which nest with us one year are the same as those of the preceding season—where our summer Robins winter, or our winter Robins summer? and who can tell whether the first Robins to come in the spring are our summer resident birds, or early migrants *en route* to more northern nesting grounds?

In the case of certain island-inhabiting birds, however, some of these questions may be answered with a fair degree of certainty. Thus Ipswich Sparrows are known to nest only on Sable Island, off the Nova Scotia coast, and we are warranted in believing that the same birds, fate permitting, return to their sandy home year after year. Gannets (*Sula bassana*) nest in the western hemisphere only on three islets in the Gulf of St. Lawrence, and it is

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probable that the surviving individuals return each year to their former breeding grounds. The Terns of Muskeget and Penikese, forming the only two large colonies of these birds remaining on the Atlantic coast, return to their island retreats every spring; and actuated by this same love of home, the Brown Pelicans of the Indian River region of eastern Florida annually repair to a certain small island for the purpose of rearing their young. Many similar cases might be cited in confirmation of the belief —supported also by isolated observations on the mainland—that birds nest in the same locality throughout their lives, and, on occasion, may even occupy their previous season's nest.

As regards the manner in which these island-inhabiting birds arrive at the nesting grounds, as far as our recorded information goes, it seems that without relation to latitude they appear each spring with remarkable regularity, not straggling back a few at a time, but sending on an advance guard, which usually remains only a short time and is followed, a few days later, by apparently the entire colony.

Thus, Mackay writes of the Terns of Penikese: "In 1893 the Terns arrived on May 10th, in the night, an advance guard of several hundred being noted early the following morning at daylight; these all left before noon of the 11th, and on the morning of the 12th, before daylight, immense numbers had again arrived. . . . In 1896 the Terns commenced to arrive during the night of May 9th; they were in evidence at daylight on the 10th, and continued to arrive all day, and on the morning of the 11th the

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usual colony had taken possession of the island." (Auk, xiv, 1897, p. 284.)

The migration of the island-nesting Terns in the tropics is apparently no less regular. Scott states that the Noddy arrived in the Tortugas "on April 20th in large numbers, but remained only two days; after inspecting their breeding grounds, all departed to return about a week later in greatly increased numbers, when breeding was almost at once commenced." (Auk, vii, 1890, p. 306.)

These insular colonies, however, not only throw much light on certain existing phases of bird migration, but they also furnish us with a clew to the origin of migration itself. This is especially true of those species whose lives are passed in the tropics or subtropics, and which we are accustomed to class as nonmigratory or as "permanent residents," but which are as regularly migratory, in the real meaning of the word, as if they summered within the arctic circle and wintered south of the equator.

Their movements are apparently in no way influenced by climate nor, at this season, are they governed by the food supply, but prompted solely by the annually recurring physiological change which fits both sexes for reproduction, they repair to a certain islet, perhaps in the heart of their range, with the one object of finding a suitable nesting site in which their eggs may be laid and young reared in safety; and this object accomplished, they desert the locality, where they may be unknown until the following spring.

Divested, therefore, of the complications which ensue when in studying the migration of birds the

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questions of food and climate must be considered, we have here the problem reduced to its simplest terms; and in the desire for seclusion during the breeding season which induces birds to conceal their nests, if possible perhaps near by, but if necessary after a journey of varying length undertaken especially for the purpose, we have a good and sufficient cause for the origin of bird migration.

An attempt to explain the present manifestation of the migratory movement involves a study of the climatic changes to which our globe has been subjected. No doubt many birds controlled by "heredity of habit" make semiannual journeys which at one time were necessary, but under existing circumstances are no longer required. Why, for example, should the Bobolink winter south of the Amazon, while its ally, the Red-winged Blackbird (*Agelaius phœniceus*), does not leave the eastern United States? I have, however, no intention of writing an essay on bird migration, and these thoughts are presented merely as preliminary to a study of the life of Pelican Island, of a visit to which they are in part the outcome.

Pelican Island is situated midway between the northern and southern extremities of Indian River, near the eastern shore of a key which here makes the river about three miles wide. It is triangular in shape and contains about three acres of ground, on which grow a few black mangroves, a cabbage palm or two, and great patches of grass; but at least one fourth of its surface is bare ground.

On one of the islands of the near-by Narrows a few pairs of Brown Pelicans are said to have nested,

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but, with this exception, Pelican Island doubtless forms the nesting ground of all the Pelicans of Indian River.

The question why the birds should select this particular island in preference to the scores of others which, to the human eye, appear to be equally well suited to their needs, is a difficult one to answer. Perhaps no true selection is shown by the existing birds, which, as with many other island-inhabiting species, may be the survivors of a once more widely distributed species, who have been preserved by the protection afforded by their island home. Such a colony might owe its beginning to a pair of birds who were the true selectors of the site of the future colony. The preserving influences of the situation were potent from the beginning. The first brood reached maturity without mishap, and in response to the instinct which prompts a bird to return to the region of its birth, they, with successive generations, came back and eventually established the prevailing conditions.

The attachment of these Pelicans for their home affords a remarkable illustration of the power of habit. Ever since the Indian River region has been subject to annual invasion by tourists, among whom the man with the gun is conspicuous both by numbers and actions, the inhabitants of Pelican Island have been wantonly and, on occasions, brutally persecuted. Scarcely a day passes during February and March that one or more boat loads of tourists, perhaps from the mainland or a passing yacht, do not land on Pelican Island and thoughtlessly cause the death of many young birds by driving them

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from the vicinity of their nests; or, by frightening the brooding birds, they expose the newly hatched and naked nestlings to the roasting rays of the sun. The harm caused by these visitors, however, is not to be compared to that wrought by so-called "sportsmen," who, in defiance of every law of manhood, have gone to Pelican Island and killed thousands of the birds simply because they afforded a ready mark for their guns. They had not even the excuse of a demand upon their skill, and must indeed have been very near the level of the brute to have found pleasure in killing birds which the merest novice with a gun would find it difficult to miss.

Perhaps even worse than this exhibition of pure savagery are the raids of the self-styled "oölogists," who, in the name of science—save the mark!—have journeyed to Pelican Island with the express purpose of taking every egg they could lay their insatiable fingers upon, afterward to boast, in some journal devoted to reporting similar crimes, of the hundreds they had collected in so many hours.

So persistently have the Pelicans been molested that at times they have been forced to desert their beloved island; but they have exhibited their attachment for it by establishing themselves on the nearest available islet, and on the first opportunity have returned to their native land.

It was in March, 1898, that my best assistant and I boarded the little sloop which was to take us to Pelican Island. Fortunately the birds were now in possession of their ancestral domain, and, as we approached, files of Pelicans were seen returning

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from fishing expeditions, platoons were resting on the sandy points, some were bathing, others sailing in broad circles high overhead. Soon we could hear the sound of many voices—a medley of strange cries

101. Pelicans on ground nests.

in an unknown tongue. Arriving and departing on wings, the inhabitants of Pelican Island have little need of deep-water harbors, and we were obliged to anchor our sloop about a hundred yards from the island and go ashore in a small boat.

No traveler ever entered the gates of a foreign city with greater expectancy than I felt as I stepped from my boat on the muddy edge of this City of the Pelicans. The old birds, without a word of protest, deserted their homes, leaving their eggs and young at my mercy. But the young were as abusive and threatening as their parents were silent and

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unresisting. Some were on the ground, others in the bushy mangroves, some were coming from the egg, others were learning to fly; but one and all—in a chorus of croaks, barks, and screams, which rings in my ears whenever I think of the experience—united in demanding that I leave the town. If I approached too near, their cries were doubled in violence and accompanied by vicious lunges with their bills, which were snapped together with a pistol-like report.[102] As I walked from tree to tree, examining the noisy young birds that were climbing about the branches, I seemed to be passing from

102. Interviewing a group of young Pelicans.

cage to cage in a zoölogical garden; and as I entered that part of the island where the nests were on the ground,[101] every bird that could walk left its home, and soon I was driving a great flock of

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young Pelicans, all screaming at the tops of their voices.

The old birds, in the meantime, were resting on the water. They might have been unpleasant foes,

103. Among the Pelicans.

but in their stately, dignified way they accepted the situation, and waited in silence for us to retire. Then they at once returned to their nests, and in a short time comparative quiet was restored on the island.

This is a sketch of life in the Pelicans' metropolis as one sees it during a brief visit, and all the accounts of the island I have seen were based on just such an experience. Consequently, I shall relate here what was learned of the Pelicans and their home during four days passed with them.

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During no hour of the twenty-four did silence reign on Pelican Island; if I went on deck at mid-

104. Head and pouch of Brown Pelican. From a fresh specimen.

night, the notes of some complaining or pugnacious young Pelicans, who in their sleep had come into too close quarters, were sure to be heard. But the Pelicans' day began at early dawn, when I could distinguish the diagonal files of from two to a dozen birds solemnly and silently starting out for the fishing grounds. One might think that, like a boat's crew, their strokes were controlled by a coxswain, as in perfect unison they all flapped their broad wings for about ten

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beats, and then spread them and sailed for as many seconds.

Generally they headed for the ocean, there to follow the line of the beach, sometimes high in the air, at others low over the curling surf, as their progress was aided or retarded by the wind. How far they went I can not say, but at a point ten miles north of Pelican Island many have been seen still winging their way to the northward, doubtless to some point where fish were abundant. Not once during the four days passed off Pelican Island did I see a Pelican fishing over the surrounding waters. It was not because they were lacking in fish, for they contained a plentiful supply of food; and I could explain the unexpected abstinence of the birds only on the supposition that the fish in the immediate vicinity of the nesting ground were left for the early efforts of the young birds before they were strong enough of wing to accompany their parents to distant fishing grounds.

105. Same as No. 104, seen from above, to show extent to which sides of the lower bill are spread.

Brown Pelicans fish at a height of from twenty to thirty feet above the water, not hovering, but

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flying slowly about, and without a moment's pause plunging on their prey with a force which would produce serious results if the bird's breast were not well padded with cellular tissue between the skin and the flesh.

I observed that when the young birds struck at me the movement was accompanied by a widening or bowing out of the sides of the lower mandible, and it is doubtless the same muscular effort which turns the pouch of the diving Pelican into a scoop net, as it were, with an elliptical ring.[105]

By sunrise most of the fishers appeared to have departed, and at this time, whether because of the absence of so many of the adults or because it was their breakfast hour, a swarm of Fish Crows came from the mainland, apparently from both sides of the river, seeking what they might devour in the way of eggs or young Pelicans, and departing after several hours' feasting.

About eight o'clock the fishers began to appear, coming, as they went, in dignified lines, which broke up as they reached the island, each bird going to its young. Then the outcry began, and the ensuing two hours were the noisiest of the day.

Pelicans are so well able to supply the wants of their families that, unlike smaller birds who bring to their ever-hungry broods only a mouthful at a time, they are not forced to feed their young at short intervals throughout the day, but the morning meal concluded, they do not again have to provide for their nestlings until afternoon. Immediately after breakfast, therefore, the parent birds went out into the bay to bathe, and the flapping of their

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wings as they dashed the water over themselves could be heard at a great distance. The bath concluded, the birds gathered in rows on the sand bars jutting out from the island, to vigorously preen their feathers, and doze in the sun; and then, at irregular intervals, bird after bird, prompted apparently purely by a love of exercise, or tempted by a possible resulting exhilaration, mounted slowly into the air until they had attained a great height, when, spreading their wings, they sailed majestically about on broad circles for hours at a time. I was at first inclined to connect this habit with the season of courtship, but observing several birds of the year, who had but recently learned to fly, join their elders, I came to the conclusion that the habit had no sexual significance, and was indulged in solely because the birds enjoyed it.

In the afternoon the fishing parties again started out, and after the resulting catch had been delivered to the clamoring young, the Pelican's day's work was concluded, and he betook himself to his favorite roost for the night. At dark a few Cormorants returned to the branches of a dead tree, a single Frigate, after carefully and repeatedly reconnoitering the situation, decided to take lodgings on a neighboring stub, and a Pelican Island day was ended.

Whether, as in the case of the Terns and Gannets previously mentioned, the Pelicans all return to their island on a certain day I can not say. Probably, however, the short duration of their migratory journey, and the fact that they come from both the

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north and the south, prevents them from joining many other birds *en route*. However, apparently most of the birds are warned at nearly the same time by a physiological change that the season has come for them to return to their nesting grounds. This is evidently in January, since in March a large number of the young on the island were found almost ready to fly, while some, as has been said, were already on the wing. There was, it is true, a great variation in the development of the young found, and indeed the birds were still laying, but I believe that the parents of these later broods had been robbed of their eggs by tourists.

A careful count yielded a total of 845 nests, which had evidently been built during the season, but only 251 of them were occupied. Most of the vacant nests were on the ground, and had been deserted by their tenants, who were now running about the island.

The 251 occupied nests contained eggs or young, as follows:

55 nests with 1 egg each;
63 " " 2 eggs "
23 " " 3 " "
63 " " 1 young each;
46 " " 2 " "
1 nest " 3 "

Incubation was found to be well advanced in eggs which were alone in their nest, showing either that one egg sometimes composes the set, or that the other eggs of the set had been destroyed. The fact that one nest was found with three young while twenty-three were found each containing three eggs,

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would indicate a high mortality among the young birds; and, indeed, no less than 94 dead young were counted. Most of these, however, were birds which were old enough to leave the nest, and death was doubtless due to the thoughtlessness of tourist visitors, who chase the young about until they fall from exhaustion, or are driven too far to find their way home.

Estimating the number of young birds which had left the 594 deserted nests at 891—which would be an average of one and a half birds to the nest—and adding two parent birds to each nest, we have 2,581 birds on wing and on foot. But this number is to be increased by the 152 young that were still in their nests, making the probable total population of Pelican Island 2,736. This calculation, however, does not take into account the eggs, from which almost hourly came new inhabitants of the island; and it is with these eggs, or rather with the nest in which they are placed, that we may begin a brief outline of the young Pelican's development.

The Pelican, although a low type of bird, is altricial, the young, unlike the offspring of Gulls, Ducks, or Snipe, being hatched in a helpless condition. The nest, therefore, is not only an incubator where with heat from the parent bird the eggs are hatched, but it is a cradle for the young. Consequently, Pelicans' nests are unusually complicated structures as compared with the dwellings of other birds equally low in the evolutionary scale.

There was a very interesting and constant relation between the character of the nest and its site, ground nests being composed largely or entirely of

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long grasses, while those nests which were placed in the trees were made of sticks and were lined with

106. Newly hatched Pelicans. Ground nest.

grasses, the nest proper being erected on a platform of larger sticks laid from crotch to crotch in the bushes in such a manner as to form a broad, firm foundation, though, structurally, it was not a part of the nest, which could be lifted without removing the platform.

The difference between the nests of straw[106] and those of sticks[107] were so marked that it seems probable their makers regularly selected sites on the

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ground or in the trees respectively Or, assuming that the same individuals might build a stick nest in the bushes one year and a straw nest on the ground the next, we have an unusual variation in the character of the nest of the same species. In the case of the Fish Hawks of Plumb Island the birds evinced an appreciation of the protection afforded them by the owner of the island by often placing their nests on the ground. Photographs of these nests, however, made by Dr. C. S. Allen, show that the birds employed as much material when nesting on the ground as when nesting in trees, the eggs on the ground being surrounded by a useless mass of large sticks. Certain of the birds, therefore, in response to new conditions, had chosen new nesting sites, but had not as yet made corresponding changes in the character of their nests.

When the nest is completed, as we have seen, from one to three eggs are laid. The period of incubation is probably about four weeks, and a careful listener may detect the presence of a hatching egg by the choking bark which the young Pelican begins to utter as soon as he has made an opening in the shell which holds him. When he has finally freed himself and appears in the world, he is about as unattractive a bit of bird life as can well be conceived.[106] His dark, purple skin is perfectly naked, he is blind, and when he is deprived of shade provided by the brooding parent, he twists restlessly about in the nest, uttering the same choking bark with which he first greeted the light.

Even at this early age he displays one of the

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strong characteristics of the immature Pelican—a pugnacious disposition. Almost before his eyes are open he bites at his nest mates for apparently no other reason than that they come within reach of

107. Young Pelican in tree nest, showing first appearance of white down.

his bill. Soon his eyes open and within a few days a wonderful change begins to take place in his appearance.[107] Little bunches of white down sprout all over his body, and, growing rapidly, transform the ugly, purple-black nestling into a snowy creature clad in softest down.

At the same time he has been growing much stronger; he is able to sit up,[108] his fighting abilities have greatly increased, and his voice, after passing through a rasping *k-r-r-r-ing* stage, has become a high, piercing cry very closely resembling the scream of a child in extreme pain. Young Pelicans uttering this call chiefly made up the chorus one could

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hear all day and at intervals during the night on Pelican Island.

Pelicans of the same nest never seem to recover from the mutual enmity with which they begin life. Quarreling is the normal condition of affairs among the children of a Pelican family, and as they always scream loudest when fighting, one cause for the continuous uproar is evident. Another is the question of food, and just at this point I may pause a moment

108. Young Pelican, downy stage.

to describe the manner in which the young Pelicans are fed.

So far as I know, Pelicans live wholly on fish,

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and the difference between the fare of a young Pelican and that of its parent is in the size of its finny food. I have seen fish twelve inches long in the throat of an old Pelican, while the pouch of a very young bird contained several fishes less than an inch in length.

It is plain to be seen, therefore, that when an old Pelican goes fishing for his family he must keep constantly in mind the size of his offspring and bring home little fish for little birds, larger fish for larger ones.

Immediately after the parent returns from its fishing expedition, the young cluster about it and the outcry begins. But the old one takes it very patiently, sitting quite still until ready to open its creel, as it were. Then he takes a stand if possible a little above the young, drops his lower bill with its pouch, when at once the young thrust in their heads to secure their morning's catch. On one occasion I saw three half-grown Pelicans with their heads and necks entirely out of sight in the parent's pouch, and all were prodding about so vigorously that one would have thought it would be damaged past mending.

Having been fed, one might suppose that for a time peace would reign in the Pelican household; but, after emptying their parent's pouch, the young immediately begin to squabble over the contents of their own. Here is real cause for war, and they grasp each other by the bill and twist and turn like athletes in a test of strength, seldom, however, with serious results.

Returning to our sketch of the young Pelican's

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growth: shortly after the acquisition of the white down, the wing feathers begin to grow. As yet the sprouting feathers are useless, but with them come strength and courage to leave the nest and to clamber about in search of the foes who perhaps have been mocking him for days, from their nest on

109. Young Pelican, wing quills appearing.

an adjoining limb. In spite of his broadly webbed toes, he manages to climb about in the bushes with more or less ease;[109] but in this climbing he is greatly aided by his bill. Indeed, if it were not for the safety hook made by the bill, head, and neck, many a young Pelican would have a prema-

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ture tumble. As it is, this hook is often the only thing that saves him if he chances to lose his footing; catching by the bill and neck he hangs for a

110. Young Pelicans, stage preceding flight.

moment, and then, like a gymnast, hauls himself up by the aid of his toes.

If the young Pelican's home is on the ground, at this age he waddles about playing by himself or fighting all comers. He dabbles in the shallow water, filling his pouch with mud and water, bits of

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sticks, shells, and weeds; then dropping the point of his bill downward so that the mud and water ooze out, he carefully examines the remainder, piece by piece, as if to see whether it is palatable. Even when alone he sometimes loses his temper. I saw one evidently much annoyed by the appearance of a displaced feather in his wing, and in a vain effort to catch it he whirled about like a kitten chasing its own tail.

But the fast-growing wing plumes soon seem to be a source of inspiration, rather than of annoyance. The young Pelicans feel a new and strange power coming to them, and they stand in the nest and aimlessly wave their now nearly grown wings, until some day an impulse prompts them to spring into the air.[110] The immediate result is a humiliating tumble, for Pelicans, unlike smaller birds, must learn to fly. Once on the ground he has a safer place to practice, and with a hop, skip, and a flap, he makes brave efforts to mount skyward. Finally he succeeds, and the awkward nestling becomes a creature of power and grace, sailing away on broad pinions to join its elders.

With this wonderful gift of flight comes a complete change in the Pelican's character and behavior. From a noisy, quarrelsome fledgeling, whose days were passed in screaming and squabbling, he is transformed into a dignified, patriarchal-like bird so absolutely voiceless that I have never heard a wild Pelican utter a sound, nor do I know of any one who has; while in disposition he has become so peaceful that under the strongest provocation he shows no desire to protest.

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Just what has influenced him—who can say? It is one of Nature's mysteries. But let us hope that the same charm may be exerted on every noisy, quarrelsome creature.

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